

# Mining

CONGRESS JOURNAL



JULY  
1950





Here coal is prepared in this new blending and washing plant completely designed and built by Link-Belt. From this plant the washed coal is delivered to the tunnel belt conveyor (right side of above photograph) on which it is transported to the river and rail loading station.

River and rail loading station also built by Link-Belt Company where washed coal is loaded into barges, or by means of a by-pass conveyor, into railroad cars.

## World's Longest Single Belt Conveyor

Through a mountain, under forests, roads and streams this single 30" wide belt conveyor transports coal from preparation plant to river and rail loading station—10,900 ft. from foot pulley to head pulley—more than four miles of belt operated by one drive!

After careful analysis of various methods of transportation ultimate economy dictated the selection of this belt conveyor. By building this conveyor in one flight, intermediate transfers, heavy machinery and power wiring were eliminated from the tunnel.

Link-Belt Company engineered, equipped and erected the blending and washing plants, the conveyor equipment and the river and rail loading station. Resulting success of this and other similar projects illustrates the importance of such coordinated effort.

### LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5,  
San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg.  
Offices in Principal Cities.



Typical cross-section through tunnel showing belt conveyor and battery driven patrol car. Standard Link-Belt type "100" idlers are used throughout the 2-mile long belt conveyor.

**LINK-BELT**  
  
*Belt Conveyor*  
**EQUIPMENT**  
**IDLERS • TRIPPERS • BELTS**  
**PULLEYS • BEARINGS • DRIVES**



**Used This Way—  
Three Five-Dollar Bills A Day  
Can Produce  
Tremendous Savings**

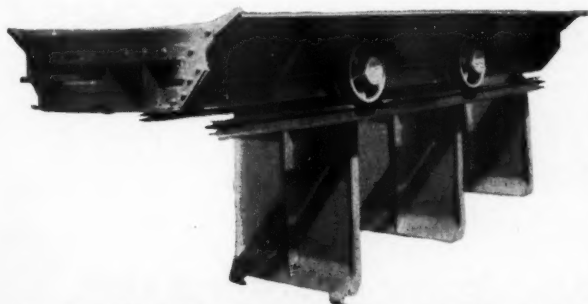
## **You Can Put \$50,000 in S-D 1-2-3 "Automatics" From the Savings of Only 8 Man-hours a Day . . .**

Change-overs to the S-D 1-2-3 "Automatic" System of mining has, in dozens of cases, changed coal mines from deep in the red losses to black profits. The S-D "Automatic" System of haulage was never so necessary to profitable mining as it is today.

When an operator tells us—"I've got to reduce my production costs \$1.00 per ton"—and when he did it by changing over to the S-D 1-2-3 "Automatic" System of transportation, it's time we were getting down to the fundamentals of capital investment vs. man-hour costs.

**Study this simple and basic analysis of Capital Investment vs. Man-hour Cost. Then do a little figuring on your own of what actual reduction of costs would be.**

- 1—\$15.00 a day saved, 266 days a year, equals \$4,000.00 annual savings in direct cost.
- 2—This \$4,000 annually will pay for \$50,000 in S-D "Automatics" over 20 years as follows:  
     \$2,500 per year for depreciation.  
     \$1,500 per year for 6% interest on average outstanding balance of \$25,000.
- 3—Therefore \$15.00 savings per day pays for \$50,000 worth of mine cars, and \$50,000 will buy 75 to 100 S-D 1-2-3 "Automatics."



These figures, of course, are only basic. Actual change-over installations (changes from obsolete, worn out cars to modern S-D 1-2-3 "Automatics") always prove savings that will multiply these basic figures many times. For Example: Ten times this basic saving would be conservative . . . result—cars would be paid for in less than 18 months. Sanford-Day Iron Works, Knoxville, Tenn.

**SANFORD-DAY IRON WORKS**  
KNOXVILLE TENNESSEE

# JOY COMPRESSORS

*HANDLE YOUR MINING NEEDS  
AT LOWEST COST  
OVER THE LONG PULL !*

***LET US PROVE THESE SUPERIORITIES  
OF JOY STATIONARY COMPRESSORS!***

- ★ Require less room—Cost less to install
- ★ Exclusive DUAL-CUSHION VALVES—more efficient and durable in service
- ★ Exclusive LOAD CONTROL—lower operating cost
- ★ Simpler Design—Longer Life—Less Maintenance



*JOY WN-112, two cylinder, two stage, double acting, is a heavy duty, continuous type compressor, built in capacities from 368 to 1828 CFM, and up to 3656 CFM as twin units.*

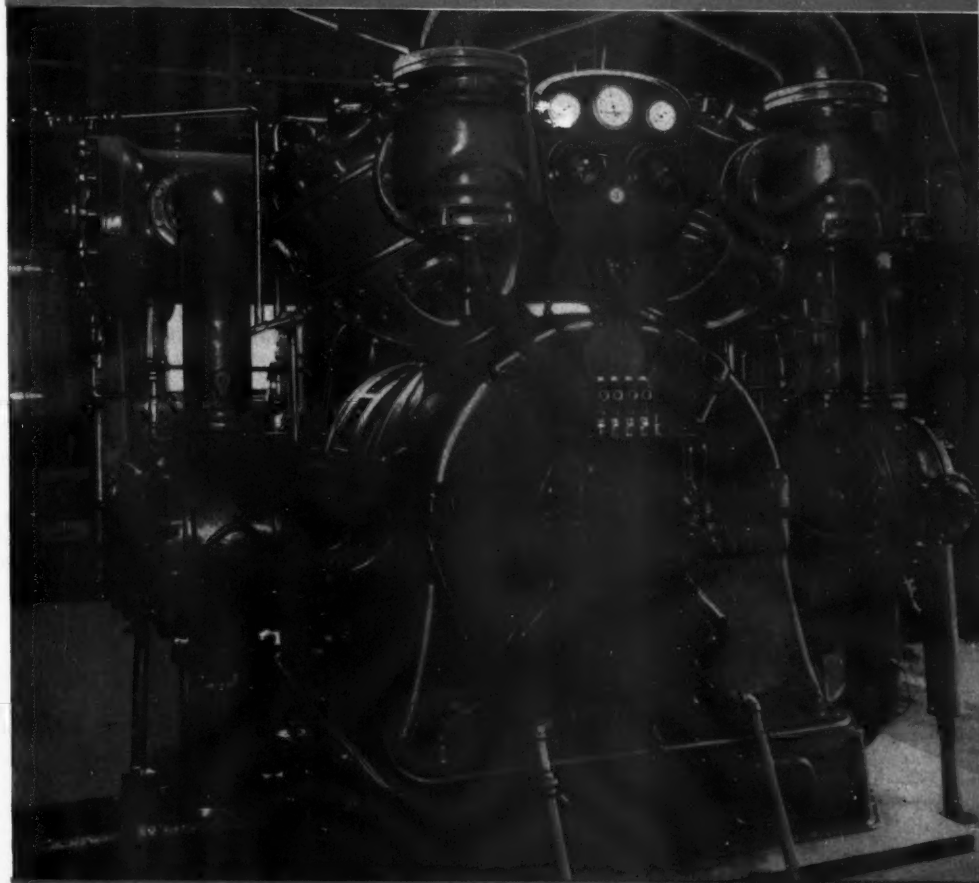
*JOY WN-114 in various sizes delivers from 1092 to 3656 CFM, and up to 7312 CFM in twin units. It's a heavy duty, continuous type four cylinder unit; two stage, double acting.*

Write for Bulletins, or

*Consult a  
Joy  
Engineer*



WSD M 282P



# JOY MANUFACTURING COMPANY

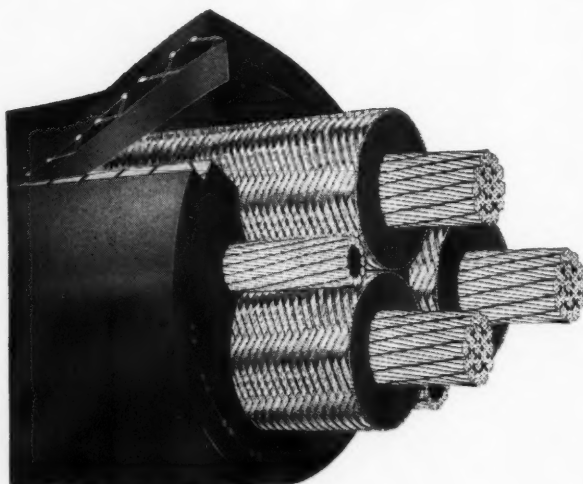
GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

# It's Butyl-Insulated!

## SECURITYFLEX type SHD

Better for your high-voltage, heavy-duty **big shovel jobs!**



The newly improved Securityflex\* Type SHD is better because it's BUTYL-INSULATED for superior electrical and mechanical characteristics. It stands up better under compression and mechanical abuse, has increased moisture resistance and much higher heat resistance (rated at 80°C.).

*Better because it has a new "copper-cotton" combination shield that*

**means faster, easier splicing  
eliminates chafing failures**

*Better because the patented grounding wires are rubber-cored. That means grounding wires that*

**will not kink  
have larger diameter for greater contact  
with conductor shield  
provide cushioned construction that won't  
cut insulation**

It all adds up to a much more rugged shovel cable. For more information on Securityflex Type SHD, get in touch with your nearest

Anaconda Sales Office or Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 60814

\*Reg. U. S. Pat. Off.

the right cable for the job **ANACONDA®**  
**WIRE AND CABLE**

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*Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress*

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## THE AMERICAN MINING CONGRESS

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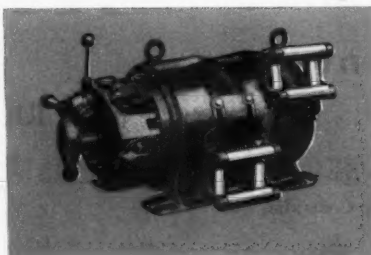
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Talk about  
"lugging power"



Gardner-Denver  
Airlushers are  
made in three  
sizes, with rated  
rope pull of  
1100, 2000 and  
2500 pounds.

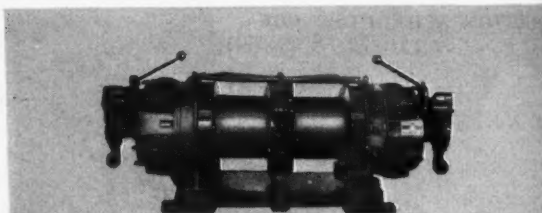


—and you're talking about  
the **GARDNER-DENVER**  
**AIRSLUSHER!**

The Gardner-Denver Airlusher  
knuckles down and lugs a pay load every trip —  
hurries the empty scraper back for another load.  
It's powered by the famous Gardner-Denver 5-  
cylinder air motor that develops high torque at any  
speed — assures maximum speed and power in  
either direction.

Other outstanding Airlusher advantages include:

- Finger-tip throttle control
- Free-wheeling clutch
- Fewer parts for easier maintenance
- Slips through small raises
- Saves air—never idles between trips



Widely used on shaft mucking rigs—the  
Gardner-Denver HMS Hoist. Designed  
for one-man operation. Positive safety  
lock. Supplied with or without automatic  
brake.



Since 1859

**GARDNER-DENVER**

Gardner-Denver Company, Quincy, Illinois

In Canada:

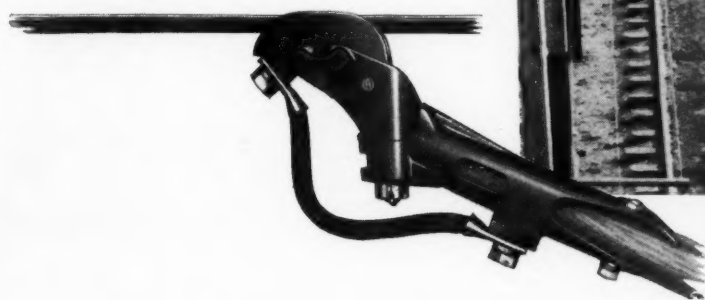
Gardner-Denver Company (Canada), Ltd., Toronto, Ontario.



Write today for complete information on Gardner-  
Denver Airlushers or the HMS Shaft Mucking Hoist.



# For Heavy Duty Haulage, USE SHOES



● If you want a smooth, dependable flow of power from the trolley wire to the collectors of your main haulage locomotives, use a collector that presents the largest possible area to the wire. That's why shoes—O-B Type-L Trolley Shoes—are better suited to heavy duty haulage than trolley wheels. Here's the reason: Shoes, in the first place, do present a larger surface for current transfer than the wheels. Because of this, current passing from the wire to a trolley shoe passes through what might be called a "line" contact, as contrasted to the "point" contact between the wire and a wheel. An abrupt jog in the wire will break the contact between a wheel and the wire, interrupting the power flow. When this happens, there is a good deal of arcing, for the flow of current has been concentrated through a very

small area. However, the current flow is distributed through a series of points in the case of the shoe, and since the shoe is less likely to break contact with the wire, the chances for power interruption and arcing are much less. You see, the pivotal center of the shoe is located in the center line of the wearing surface, eliminating any tendency for the shoe to tilt because of friction between the shoe and the wire. Further, a jog in the wire, while depressing the leading end of the shoe, will press the trailing end more firmly against the wire. The reverse is true when the center of the shoe passes the jog.

Your O-B representative will be glad to tell you more about the advantages of shoe current collection. Ask him what it can do for you in your mines.

4055-M



SHOE CONTACT



WHEEL CONTACT

Field tests show that under identical conditions of heavy electrical load, trolley shoes outlast wheels many, many times. This is because of reduced arcing and burning with the use of shoes. The sketches show the difference in surface covered by the wheel or shoe in contact with the wire.

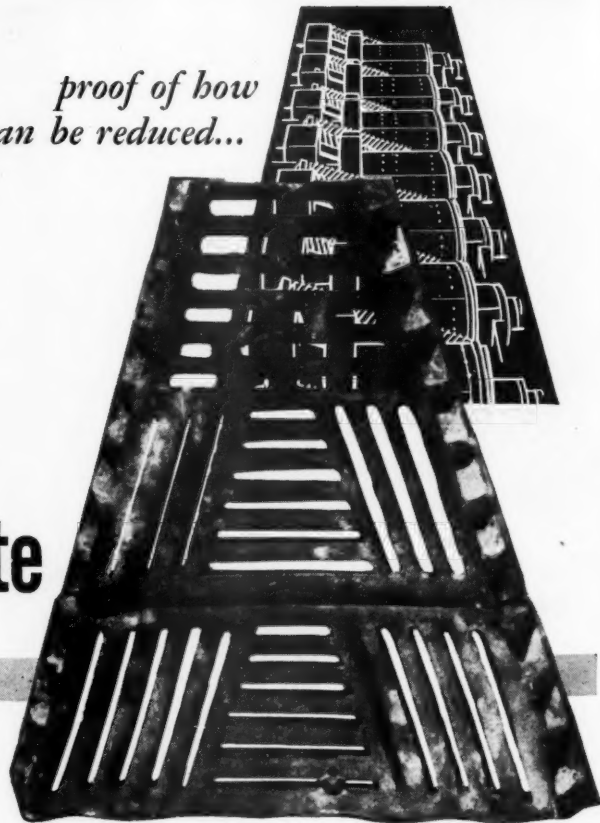
## Ohio Brass

**MANSFIELD**  **OHIO, U. S. A.**

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

*proof of how  
milling costs can be reduced...*

this  
**AMSCO® Grate**  
has milled  
**193,797 tons**



**An actual example of how AMSCO Grates last longer,  
reduce shutdowns and increase milling profits.**

**Equally Big Savings On Liners, Too!**

Recent production figures on Amsco double-wave Liners in a mill grinding copper ore: 667,308 tons ground . . . at a liner cost of about a half-cent per ton! *It will pay you to investigate the long, low-cost service of Amsco Liners!*

Find out more  
about Amsco  
Liners and  
Grates



Be sure to ask for a copy of Bulletin 449-ML. Describes the characteristics of Amsco ball mill alloys; gives additional facts on dollar-saving installations. Free copy on request.

Here's an actual photograph that proves an important, profit-building point to users of ball mill equipment . . . *the real cost of liners and grates is the actual service cost.*

This Amsco grate has milled 193,797 tons . . . compared with just 113,000 tons for a previously used hardened steel grate which ran under identical conditions. And, during this period of 72% greater tonnage milled, *the Amsco grate required no down-time for repair.* The previously used grate started to crack at 50,000 tons—required many shutdowns for plugging holes.

Because of heavy impact, this particular Amsco Grate was made of austenitic chromium-manganese steel—one of three Amsco alloys developed for specific conditions of impact and/or abrasion. These Amsco liner and grate alloys can result in big savings on milling costs. Amsco Engineers are fully qualified to make alloy recommendations based on your operating conditions—*write today for the name of the Amsco engineer nearest you.*

AMERICAN

**Brake Shoe**

COMPANY

**AMERICAN MANGANESE STEEL DIVISION**

**422 EAST 14th STREET • CHICAGO HEIGHTS, ILL.**

Other Plants: New Castle, Del., Denver, Oakland, Calif., Los Angeles, St. Louis. In Canada: Joliet Steel Division, Joliet, Que.

**THE BEST BELTING  
IS ALWAYS  
THE BEST BUY!**



### **Hewitt-Robins Conveyor Belting Lasts Longer Because It's Matched to the Load**

Over the years, belt conveyor operators have found it's false economy to "cut corners" on their belting. The best belting they can buy has always proved *the best buy* . . . in extra months or years of service, freedom from repairs and ease of maintenance.

And what's "best" for one materials handling job isn't always best for another. That's why we make three types of belting: Maltese Cross® for the hardest, toughest jobs; Ajax® for general service, and Conservo® for lighter applications and portable conveyors.

Each is matched to the load it

will carry. Ajax Underground Belting, for example, is designed for heavy-duty, around-the-clock underground coal mine service. Because it's built to take the hardest kind of punishment, it means bigger tonnage hauls at less cost.

There's a Hewitt-Robins conveyor belt for every bulk materials handling assignment, below and above ground. For the best buys in belting, call your Hewitt Rubber distributor (listed under "Rubber Products" in the classified phone book), or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, N. Y.

### **EVERYTHING YOU WANT IN CONVEYOR BELTING!**

- Hewitt-Robins belting is especially treated to resist the destructive action of moisture and mildew. High-grade frictions and liberal skim coat insure against ply-separation.
- Abrasion-resistant covers are made of extra tough rubber. Rigid-edge construction prevents curling . . . insures true roughing.
- Heavy textile reinforcement provides great strength with high flexibility.
- Dollar for dollar, you can't buy longer belt life anywhere!

**HEWITT-ROBINS**  
**CONVEYOR BELTING**

**HEWITT-ROBINS  INCORPORATED**

BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOK ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

# Cummins® Custom-built Diesels



*Built  
not  
once  
but  
Twice*

## The better-built engine for better power profits

Every lightweight high-speed Cummins Diesel is actually built *twice*. After initial assembly, each engine is run-in on the test block. Then it is torn down and carefully re-inspected — after that it is re-assembled and tested *again* to assure *peak performance*. And that is only *one* example of the extra care, the precision-workmanship . . . that goes into every Cummins custom-made engine.

That's why a Cummins Diesel is an investment that has *greater earning power* for you. The finest of engine-craftsmanship...exclusive Cummins fuel system...and custom-built engines "that fit your job" make a rugged, quality-engineered Cummins Diesel *the better buy for your power needs*.

Contact your Cummins dealer. He has more facts to show you about making more profits with



TRADEMARK REG. U. S. PAT. OFF.

## Diesel power by **CUMMINS**

**CUMMINS ENGINE COMPANY, INC. • COLUMBUS, IND.**

EXPORT: CUMMINS DIESEL EXPORT CORPORATION  
Columbus, Indiana, U. S. A. • Cable: Cumdix

Lightweight High-speed Diesel Engines (50-550 hp) for:  
On-highway trucks • off-highway trucks • buses • tractors • earth-  
movers • shovels • cranes • industrial locomotives • air compressors  
logging yarders and loaders • drilling rigs • centrifugal pumps  
generator sets and power units • work boats and pleasure craft.







## Helps eccentrics keep their bearings . . .

A large midwest coal mine has tested a number of products for the lubrication of screen eccentric bearings. None of these lubricants, however, has equaled the performance of a SUPERLA Grease recommended by a Standard Oil lubrication specialist. This SUPERLA Grease has successfully handled the job during 30 years of hard service. It has prevented bearing failures and minimized maintenance because of these lubricating qualities:

**High load carrying ability.** SUPERLA's strong lubricating film keeps wear at a minimum, protects bearings against shock loads.

**Unique heat resistance.** SUPERLA Greases remain stable at prolonged normal temperatures. Moreover, they provide safe lubrication during periods when operating temperatures are in excess of that which ordinary cup greases will withstand.

**Stability to oxidation.** Because of their

**SUPERLA**  
REG. U. S. PAT. OFF.  
**Greases**

highly stable composition, SUPERLA Greases resist changes produced by oxidation, retain their original condition longer than conventional products do in storage and in use.

These qualities of SUPERLA Greases will reduce bearing maintenance in your mine not only for screen eccentrics but for a great variety of tippie, shovel, and underground equipment.

Discuss the advantages of SUPERLA Greases with a Standard Oil lubrication specialist. His headquarters are near your mine. How you can benefit from his services is explained at the right.

Standard Oil Company (Ind.), 910 South Michigan Avenue, Chicago 80, Illinois.

## What's YOUR problem?



**H. Dillingham**, lubrication specialist at Standard Oil's Evansville (Ind.) office, has helped this midwest mine solve vital operating and maintenance problems through his recommendations of lubricants. Within easy reach of the mine, he has given operators engineering service when they needed it.

There is a corps of such Standard Oil lubrication specialists throughout the Midwest. You'll find one located near your mine. Through special training and a lot of practical experience, this man has gained a working knowledge of lubrication that can mean real savings for you. You can obtain his services by contacting the nearest Standard Oil (Indiana) office. Discuss with him the savings you can make with such outstanding products as:

**STANOIL Industrial Oils.** Here's one line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

**SUPERLA Mine Lubricants.** These new, improved oils and greases provide better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

**CALUMET Viscous Lubricants.** On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

**STANDARD OIL COMPANY (INDIANA)**



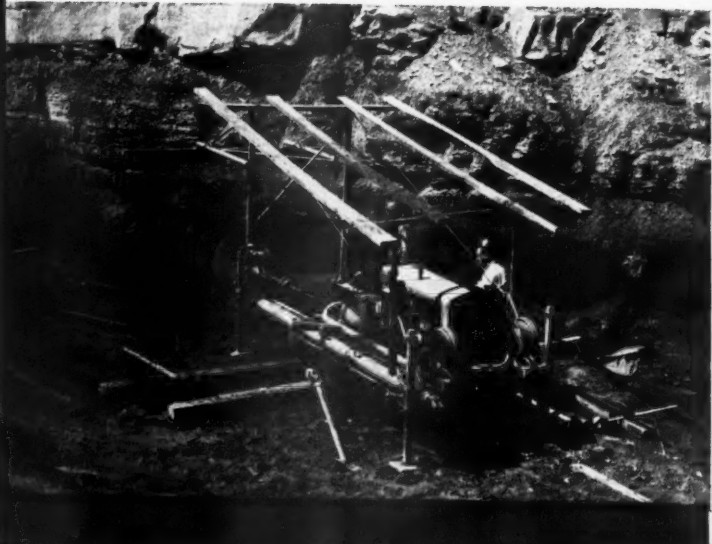
# When Recovery Costs Are **OVERBURDENED**

**CARDOX-HARDSOCC**


## **DIRECT MINING DRILLS**

When overburden removal becomes too costly for further profitable stripping, it's not necessarily the signal to abandon operations. In just such conditions, the CARDOX-HARDSOCC Direct Mining Drill has enabled many mines to continue economical coal production.

These units, designed specially for the purpose, drill into the seam and bring out the coal in a continuous stream. Teamed up with portable conveyors (see illustration), they provide facilities for automatic loading of trucks.



**CARDOX-HARDSOCC** Direct Mining Drills handle augers up to 40 inches in diameter. Augers to 24 inches are powered by a 32 H. P. engine; larger augers by a 100 H. P. or larger engine. All Direct Mining Drills are available with electric motor drive for underground use.

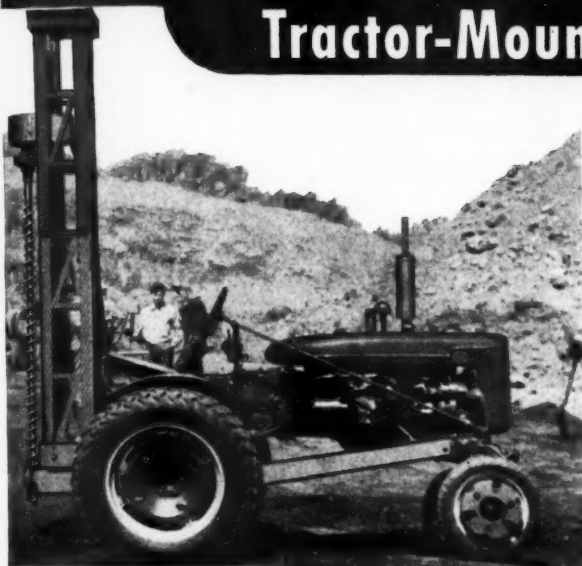


Augers are in 6-foot lengths that can be quickly coupled. The maximum depth of the drill hole ranges up to 90 feet, depending upon the diameter of the auger and the type of coal.

# NEW MULTI-USE DRILL

*reduces costs on many kinds of drilling*

## CARDOX-HARDSOCC Tractor-Mounted Vertical Drill

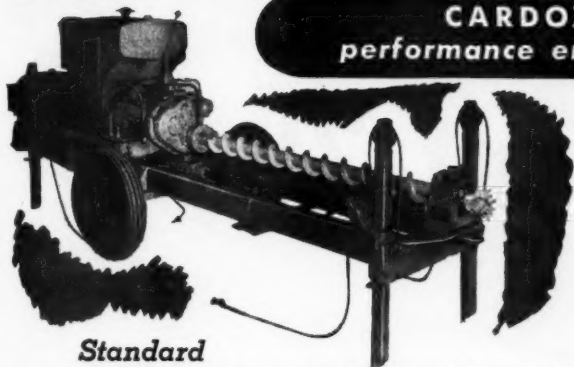


### One Unit Handles All of These:

- Rapid Drilling of Stripped Coal
- Crop Line Testing
- Foundation Testing
- Core Drilling

Here's a whole drilling combination in a single economical package! Furthermore, because of its powerful tractor drive you can use this drill in rugged terrain where use of other types of drilling equipment is difficult or impractical. It saves you time on the job — and between jobs — moves from hole to hole or from one site to another with full tractor mobility. The drill is driven by the power take-off of the tractor engine. It easily drills holes up to 6 inches or more in diameter. The augers are in 6-foot sections, available with any standard connections. The unit can be converted from one type of drilling to another in just a few minutes.

### CARDOX-HARDSOCC DRILLS *performance engineered to stay on the job!*



**Standard  
HYDRAULIC HORIZONTAL DRILL**

*Fast on the job — easily towed or trucked from job to job.* When set up in a pit it can be readily moved from hole to hole by the operator and a single helper. Available with either air-cooled gasoline engine or electric motor. Standard equipment includes seven 5 1/4" diameter, 6' auger sections for drilling up to 42' in depth. Regular hard-surfaced bits or tantalum-tungsten-carbide cutterheads may be used.

CARDOX-HARDSOCC Hydraulic Horizontal Drills may also be had in self-propelled models—gasoline or electric powered.



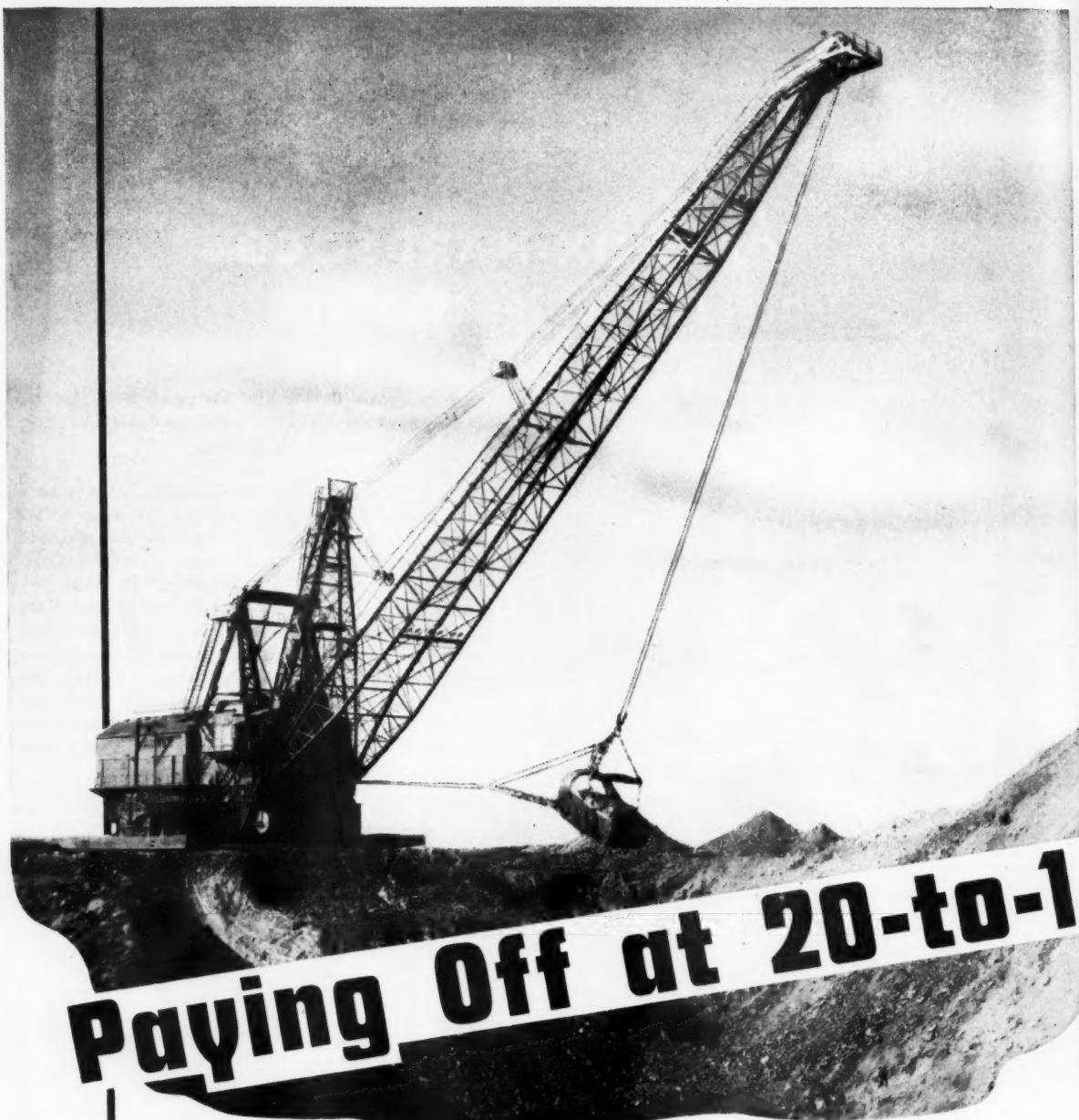
**Standard  
VERTICAL DRILL**

In the production of coal, clay, gypsum, asbestos and other minerals, users report as many as 110 holes, each 10' deep, drilled in a single day! May be had with air-cooled gasoline engine or electric motor. Weight of the engine or motor forces the auger and cutterhead into the material being drilled. The mast is easily lowered for towing from job to job. The 6' augers may be quickly coupled for drilling deeper holes.

CARDOX-HARDSOCC Vertical Drills are also available in heavy-duty model for very tough, deep drilling jobs.

**There's a CARDOX-HARDSOCC Distributor or Representative near you. He can help you step up efficiency and cut your costs. Call upon him *first* whenever you need any kind of drilling equipment.**





**Paying Off at 20-to-1**

**O**VERBURDEN ratios of 20-to-1 present no problem to this 25-cubic yard Bucyrus-Erie 1150-B walking dragline. In cover averaging 50 feet and going as deep as 80 feet, this 1150-B has given an exceptionally good account of itself since it was put in service in 1948. Reliable performance throughout years of operation

puts Bucyrus-Eries out front in stripping jobs like this one, involving a total of 250,000,000 yards. The *years ahead* design of the 1150-B, with its balanced speeds and power, sturdy construction and fast cycle pace, is assurance of its continued fine performance in years to come.

95L50

**BUCYRUS  
ERIE**

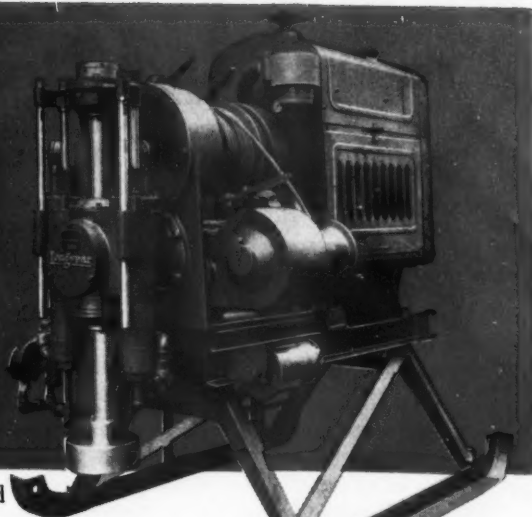
SOUTH MILWAUKEE, WISCONSIN



IT'S THE

*Built-in  
Quality*

THAT COUNTS



That's why Longyear insists on selected materials, and precision machining in building diamond core drills. Here are examples of parts or processes that must meet critical tests: sound castings, high-grade alloys for gears and shafts, perfect alignment, precise tolerances, quality bearings, thorough lubrication. These features give Longyear drills endurance, steady performance, economical operation. Select any Longyear model and know that goodness goes all the way through.

#### ECONOMY RESULTS FROM BUILT-IN QUALITY

The Junior and UG Straitline core drills illustrated are popular models. They repeatedly demonstrate to users the value of sound internal construction. Operators are getting **STEADY DRILLING PERFORMANCE**, and **LARGER FOOTAGES** per shift because there are no break-downs due to inferior materials or workmanship. These factors add up to **OPERATING ECONOMY**. The word gets around. That is the reason for new orders, and why repeat orders keep coming in. Think it over and let us quote you on suitable drill equipment for your next job.

#### CORE DRILLS AND SUPPLIES

Longyear manufactures a complete line of core drills—large or small, for surface or underground use. There is a quality-built model suited to your needs.

Also, quality-built diamond drill accessories and standard supplies are available from stock.

Write us for specific information.



Upper Picture—Junior Straitline, Diesel Driven  
Capacity: 1000' of EX core or 800' of AX core

Lower Picture—UG Straitline, Air Driven  
Capacity: 2000' of EX core or 1600' of AX core

Each model is equipped with screw feed or hydraulic drilling head; also may be supplied with air, electric, gasoline or Diesel motive power.

Remember, we do core drilling under contract. You may prefer to use this service rather than to buy drills. Consult us on your requirements.

**E. J. LONGYEAR COMPANY**

MINNEAPOLIS, MINNESOTA, U.S.A.

NEW YORK OFFICE, 1775 BROADWAY

**CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA**

**DIAMOND CORE DRILLS • CONTRACT CORE DRILLING  
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS**

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

# Looking for piping...dependable quality? You'll get both from CRANE

## BUILT TO STAY IN SERVICE LONGER

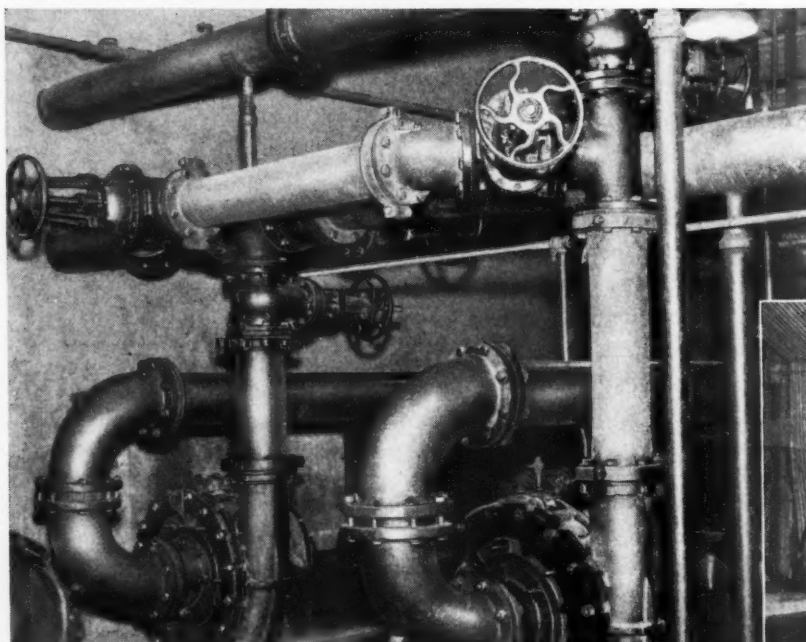
That's what these valves are noted for—long service life with low maintenance cost. Here's why you'll like Crane 125-Pound Iron Body Gates.

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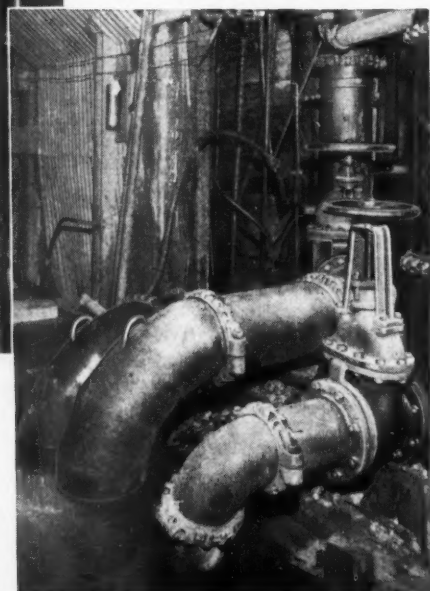
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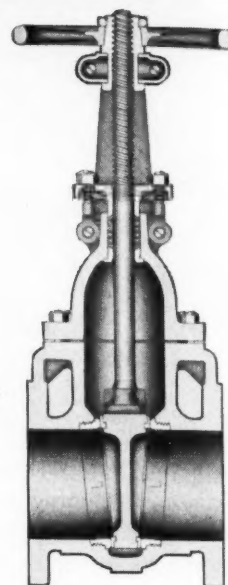
*DRAINAGE WATER STORAGE in a metal mine. Here Crane Quality piping materials give outstanding service under severe conditions.*



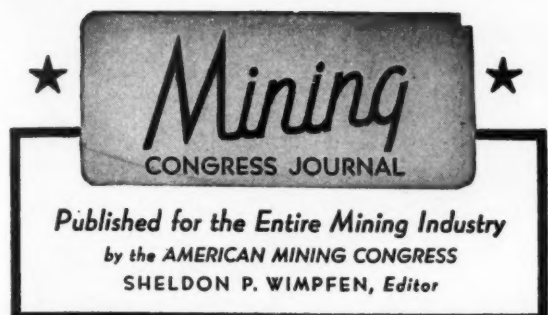
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**Cross-section, No. 465 1/2 Iron Body Flanged Gate, Brass-Trimmed, Sizes 2 to 12 in. Working Pressures: 125-Pounds Steam; up to 200-Pounds Water, Oil, Gas. Available in larger sizes up to 48 in.**



VOLUME 36

JULY, 1950

NUMBER 7

## "Peacetime" Battle

"BATTLES are only a sort of public verification of mastery gained during 'peace,'" said William James, famed naval historian. As this is written, American fighting men are carrying out United Nations punitive sanctions in Korea. There is risk that this procedure might result in a war that would again engulf the major portion of the world. Since, however, the initiative does not rest with the United Nations nor the United States, none of our professional or amateur prognosticators are doing anything more than making educated guesses.

This activity is a healthy one; every enemy capability should be thoroughly considered in enabling this nation to seek the right course. Unfortunately for us, there are some most unpleasant facts that must be faced in laying plans for the part we will play when and if the opposition decides to quit heckling and move out in force. No matter where the enemy may strike or in what force, we must be prepared to answer with the measure most likely to result in our victory; delivery to the enemy in quantity of raw materials in fabricated and injurious form. This requires an abundant supply of minerals, the product of a healthy, vigorous mining industry.

Tonnages of those metals essential to the prosecution of a war can only come from a "live" industry such as could exist in the climate created by adoption of the tax recommendations made by the National Minerals Advisory Council and the American Mining Congress. But a dismal picture is drawn when one examines the results of a recent survey made through the members of a society that embraces most of those technicians who make the decisions as to whether exploration or development of new metal deposits is economically justifiable.

This study, which also inquired into corrective measures, was conducted to determine the relative extent of new development and exploration being carried on today as compared with 1940, and the relative health of the various branches of the industry at both ends of the decade.

The examination revealed that exploration and development in the coal industry had not changed materially, but the general opinion held was that labor troubles and taxes had placed the industry in a far less favorable condition than in 1940.

Since 1940 exploration and development of new iron ore reserves has increased by 50 percent, but

the widespread thought encountered was that, in event of war, the industry would not be in as good shape to produce as it was ten years ago.

Figures concerning exploration and development for the nonferrous metals indicate a reduction of 74 percent. The consensus of opinion was that, should an emergency arise, the industry would be badly off in comparison to the condition prevailing in 1940.

These figures, together with the considered opinion of the experts, glaringly reveal that but little effort is being made to find new ore reserves. At the same time, many mining companies maintain high production from ore deposits developed with prewar dollars and at prewar costs. This ore is being turned into 1950 depreciated dollars. If an endeavor was made to replace those reserves under present costs and subject to current taxes, it would be almost impossible to show a profit commensurate with the risk.

When we examine into the number of operating underground mines, we find that, in California, the total had declined by 76 percent from 1940 to 1949 and that mining employment has fallen off by 72.3 percent in this last decade. In Utah the number of shipping mines has dropped 89 percent in the same period; Oregon has undergone a 95 percent decline in underground lode mining and Nevada has suffered a 62.7 percent reduction. Although final data are not available on the number of mines producing strategic metals, in the period 1940-1949, lode mines producing either copper, lead, zinc, gold or silver, declined in New Mexico, 53 percent; in Arizona, 67 percent; in Montana, 59 percent; and in Colorado, 43 percent.

What do these figures mean to us? When we weigh them against the exceptionally high World War II submarine sinkings of shiploads of critical materials, and consider the superior underseas fleet that opposes us today—there is food for thought! Domestic mining undergoes a steady down trend in the face of foreign imports. New reserves are not being found at an adequate rate. "Know-how" is being lost as important strategic metal mines are forced to cease operations. Have we lost our "peacetime" battle? It appears most unlikely that we would be able to achieve, as quickly as needed, the output of minerals and metals to sustain a major effort.

This condition would be understandable if it had been brought about by natural exhaustion. Such is not the case. On a course closely duplicating the errors made in the post World War I era plus a few new and untried mistakes, lack of sound and constructive government policies has brought the domestic mining industry to its present precarious situation.

Included among the harmful factors are the dead hand of a Federal tax structure that permits insufficient return to justify the risk involved; inadequate depletion allowances and a tariff system too weak to encourage competition with foreign imports.

World events focus attention upon mineral supply. To enable the mining industry to fulfill current requirements and to meet the demands of another emergency, the recommendations of the NMAC and the AMC should be adopted immediately. It is not yet too late to take this step to assure this nation's continued "peacetime" mastery.





The Elizabeth mine in the scenic hills of Vermont has a production record exceeding a century and a half

# Elizabeth Mine Reorganized For Efficient Production

IN 1793 two men looking for sugar maple trees discovered an interesting outcrop. The mining of iron sulfides for the subsequent production of copperas (ferrous sulfate) began that summer and operations continued intermittently until 1839.

Copper mining began in earnest in 1830 when a smelter was built, work continuing until 1839 when it was closed for a period. Operations were always resumed when copper prices were high. In 1861 a new smelter was erected and mining was energetically pushed until the close of the Civil War. The mine again closed until 1872 when the manufacture of both copperas and copper was resumed. A new smelter was built in 1880 and operated until 1888 when the mine shutdown and the smelter was closed for good.

During the first World War a flotation mill was built and operated for the duration. A second mill, using differential flotation was built in 1927 and operated about three years. Both these mills were of small capacity.

## Complex Geology Characterizes Deposit

The copper-bearing orebodies occur in schists whose age is assigned to

## Realistic Changes in Mine, Mill and Management Turn Loss into Profit

By C. B. BENSON,  
J. C. WANGAARD  
and  
H. A. JOHNSON

Respectively Treasurer, Mine and Mill Superintendent  
Vermont Copper Co., Inc.

the Silurian and Lower Devonian. In and near the mine the rock is chiefly biotite schist containing varying amounts of garnet. The beds have been strongly folded along northerly trending axes. A band of hornblende schist about 60 ft thick gives a clue to the local structure and outlines a tight overturned syncline in which the ore occurs. Orebodies follow the steep east limb of the syncline where, as a result of overturning, the beds dip steeply eastward. The main oreshoot is a replacement of biotite and quartz-biotite schist in a horizon that lies

about 100 ft stratigraphically above the hornblende schist.

Drag-folding and strong shearing have deformed the beds of schist and played a part in the localization of the ore. Because of the plunge of the general structure, and local drag-folding, the main ore shoot rakes northerly at an average angle of roughly ten degrees. Below the main ore shoot there is a second and less continuous shoot having about the same rake and occupying the faulted keel of the syncline close to the top of the band of hornblende schist.



The ore consists of massive pyrrhotite with a little pyrite and with chalcopyrite as the valuable minerals. In general, the sulphide bodies conform to the structure of the host rock, but locally stringers and bands of sulphide definitely cut the schist. Some of the ore contains bands and whips of incompletely replaced wall rock. Adjoining the ore zone the rock is strongly altered by development of sericite and destruction of the original biotite.

## World War II Reopened Mine

In 1942 the present Vermont Copper Co. was organized for the purpose of reopening the Elizabeth mine and building a modern flotation mill. The capital expenditures exceeded \$1,250,000. Due to the Government subsidy, with its high price of copper, the operation was profitable and Government Metals Reserve advance of \$550,000 was repaid in full. A four-year research program for the production of electrolytic iron was carried on among other activities.

After the subsidy was dropped on July 1, 1947, the mine began to lose money and continued in the red for two years, the loss averaging \$15,000-\$20,000 per month. This loss was due to the decrease in the grade of ore, to the drop in copper price from 27¢ to 23½¢, to a heavy development program and especially to wasteful practices which had gradually grown up during the prior prosperous four years. In February 1949, a contract, for the sale of copper, was made with the Government, for 30,000,000 lb distributed over four years. This copper was for stock piling purposes.

Since May 1949, when the present management under Frank Eichelberger as president took over, the mine has received the Government floor copper price of 19¼¢ as contrasted to the 23½¢ price which had prevailed for well over a year.

## Realistic Changes Improve Efficiency

Several drastic changes were made immediately. Shrinkage stoping had always been employed for ore production. This was changed over to sub-level benching as rapidly as could be done and extravagant company policies were curtailed or stopped entirely. The mill was put on continuous operation and the mine cut back to a five-day week. The tonnage through the mill was increased to the capacity of the ball mill and costly overhead was drastically cut, without however impairing the effectiveness of the organization.

These changes resulted in a saving of almost \$1,000 per day. This saving together with the increased tonnage resulted in a cash gain of about \$15,000 per month on a production of

**In May, 1949, Frank Eichelberger, who brought the Sunshine mine and other properties to profitable production, took over the reins of the Vermont Copper Co., Inc. On these pages the mine management describes the many changes made in boosting production from 450 to 750 tons per day to eliminate daily operating losses.**

approximately 600,000 lb of copper per month.

## Staff Organization

The same operating organization that has been with this company since its inception is still on the job but functions in a very different manner. The three department heads, mine, mill and office, function as an operating committee and meet frequently to go over management details. A financial report, showing in detail every activity is prepared daily and sent to the president and members of the executive committee. This report shows the loss or gain for the day and the month to date. The last day of the not vary more than two or three percent from the figures that are obtained from final smelter and Government settlements.

Transformation of an unprofitable operation to a profitable one was brought about by a reorganization of administration and management at the top levels. Formerly, virtually all company policies were determined and directed by the president, without the board of directors or its executive committee having any real voice in these matters. Since the reorganization, the broad policies of management and operation have been decided upon by the executive committee of the board of directors and the president.

These policies are executed at the management level by the mine superintendent, the mill superintendent and the treasurer of the company, who function as an informal management committee. The mine and mill superintendents have full responsibility and authority for the operations in their respective departments in contrast to the former policy of merely carrying out directives and orders. Accounting and office work and general executive policies and functions are the responsibility of the treasurer of the company. These three operating heads are individually and collectively responsible to the president of the company.

## Daily Reports Improve Operations

One of the first steps taken by the new management was to institute a daily summary of operations, or daily mine report, which has proven most effective in improving operating efficiency and control. The first objec-

tive of this report is to make it possible for the president of the company to follow the progress of the operation closely and continuously even when it is necessary for him to be absent for extended periods. The second function is to enable the department heads to watch more closely all phases of the operation both daily and progressively through the month.

Provided by the report are a summary of milling and metallurgical results, an accurate statement of costs for labor and materials, an estimate of other costs and expenses based on the experience of preceding months, and finally, the estimated profit or loss from each day's operation. The report is supplemented by comments from each operating head regarding unusual conditions and events.

Although the daily report must be regarded as only an estimate because of several daily costs and expenses which can only be approximated, the cumulative operating results for each month are surprisingly close to the final results after all charges and adjustments are made.

The benefits derived from the use of the detailed daily mine report became apparent almost immediately, and have grown increasingly and steadily with use. The report has served to make the operating heads increasingly cost-conscious, and to regard much more critically the relationship between mine production, metallurgy and profitable operation. The thinking is now in dollars of profit rather than in pounds of copper produced.

When the relationship between production and costs results in an operating loss for any day, this fact is known almost immediately by the operating heads. The result has been to focus attention and effort on profitable operation rather than on the mere production of ore from the mine and concentrates from the mill. Furthermore, the department heads have become increasingly conscious of the interdependence of all phases of the operation and the need and advantages of team-work and cooperation. This attitude has become increasingly apparent down through the ranks of the workers and operators.

Under the previous management a comprehensive monthly report of operations was developed. This report has been retained, although in a modified and simplified form.

# Mine Plant and Production Methods

OPERATIONS are carried on through two adits both at the 300 level elevation. The No. 1 adit, which is 1250 ft long, handles the production from above the 300 level in the south end of the mine. The No. 4 adit, which is 400 ft long, is located 1100 ft north of No. 1 and handles production from below the 300 level through the No. 3 shaft.

The No. 3 shaft is vertical, with its collar on the hillside 100 ft above the 300 level. The shaft is 17 ft 8 in. by 6 ft 4 in. outside dimensions, and consists of three 5 by 5-ft compartments, inside timber. One compartment is a cageway, another a skipway and manway, pipe and cableway are carried in the third. The capacity of the skip is 60 cu ft. Sets are of 8 by 8-in. Douglas fir on 5-ft centers; guides are 4 by 6-in. Douglas fir. Bearing sets are installed below each level; total shaft depth is 814 ft.

There are two sumps, one below the 575 level with a capacity of 12,000 gallons and one below the 975 level with a capacity of 66,000 gallons. Pomona pumps of 450 gpm capacity discharging through 6-in. lines are installed at each location. The mine makes about 30 gpm.

Power is brought underground at 2200 v to substations on the 575 and 975 levels and reduced to 440 v for slushing, battery charging and ventilation. Compressed air is carried down the shaft in 6-in. lines and water in a 2-in. line.

Pockets of 250 tons capacity each are installed below the 575 and 975 levels and are equipped with air-operated gates. Ore and waste pockets above the 300 level have capacities of 600 and 100 tons respectively.

The timber headframe is built of 8 by 8-in. Douglas fir posts and 10 by 10-in. backlogs covered with 1-in.

boards and composition siding. Sheave wheels of 6-ft diam are 40 ft above the collar. The hoist is located 228 ft from the collar with an idler tower between.

An Allis-Chalmers 72 by 94-in. single-drum, electric hoist, grooved for 1 1/4-in. rope, with a rope pull of 16,800 lb and 1000 fpm rope speed, is equipped with hand-operated brake and Simplex safety controller. It is driven by a 250 hp, 2200 v, 60 cycle, 3 phase, 720 rpm induction motor.

A two-compartment winze inclined 63 deg to the east was sunk for exploration from the 575 to the 975 level and is now used only for servicing the 725 and 850 levels.

## Burn Cuts Drive Headings

Haulage drifts and crosscuts on the 300 and 575 levels are driven 10 by 8 1/2 ft at a grade of 0.5 percent in favor of the load. The rail is 45 lb and the gauge 36 in. Two men using two 3 1/2-in. automatic drifters, column mounted, drill and blast a six-foot round in a shift. The burn cut is used exclusively and an average round consists of 36 holes. When in waste the rock is rather difficult to drill and break, but, in ore, no difficulty of this kind is experienced. The mucking crew of two men, using an Eimco 21 B loader, 54-cu ft, side-dump cars and a four-ton trolley locomotive, muck out and lay track in a shift. Four-car trains transport ore.

Haulage drifts and crosscuts on the 975 level are driven 7 by 8 1/2 ft. The rail is 30 lb and the gauge 24 in. Rocker cars of 29-cu ft capacity, loaded with an Eimco 21 B loader and hauled by a one-ton Mancha trammer, are used to muck out. Six-car trains are used on ore haulage.

Raises vary in size from 5 by 6 ft

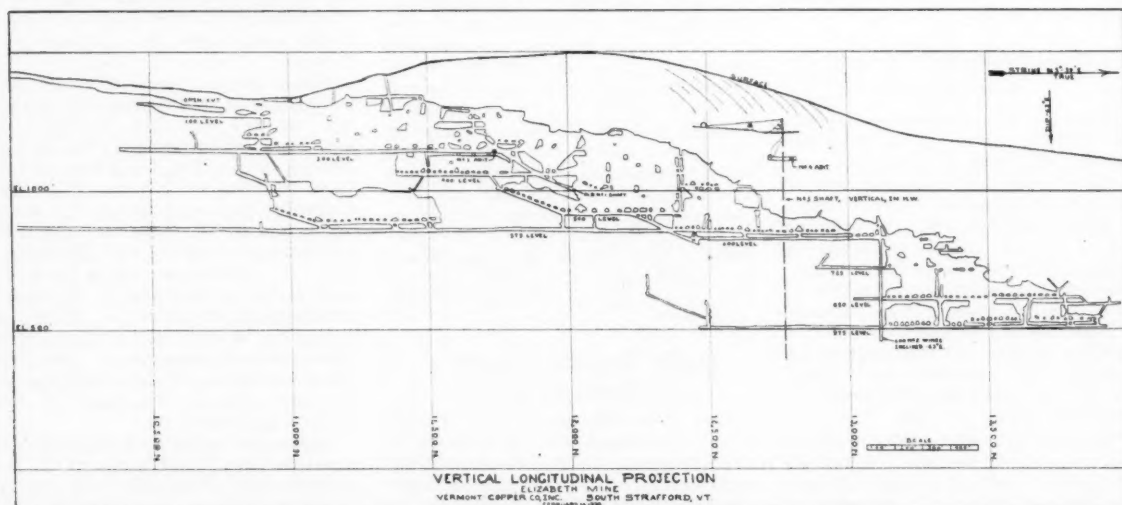
to 6 by 8 ft, depending on the use, and wherever possible are driven at 50 deg. Two men, each with a stoper, drill and blast a 6-ft round in a shift. The muck either drops into a chute, scraped to chute, or is loaded with a mucking machine.

## Benching Reduces Stopping Costs

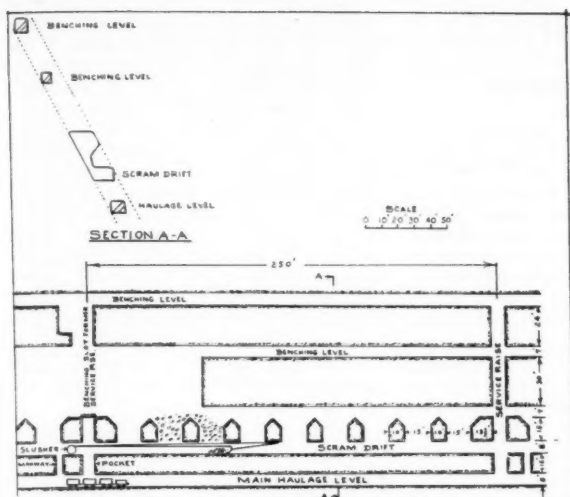
During the past year the stopping method has been changed almost entirely from shrinkage to benching, principally to avoid the high cost of draw-hole preparation and the breaking of considerable waste in this operation. Benching also eliminates the necessity of breaking outside the ore limits to prevent muck from hanging up in narrow sections. The saving in mining costs is appreciable. Practically all muck is scraped to chutes by electric slushers of 20, 35 and 45 hp pulling scrapers varying from 42 to 60 in. The trend is towards greater use of the larger machines.

From the 575 level to the surface, the ore zone averages 20 ft in width and from the 575 level to the 975 level, 18 ft in width. The wall rocks are strong and there is little dilution.

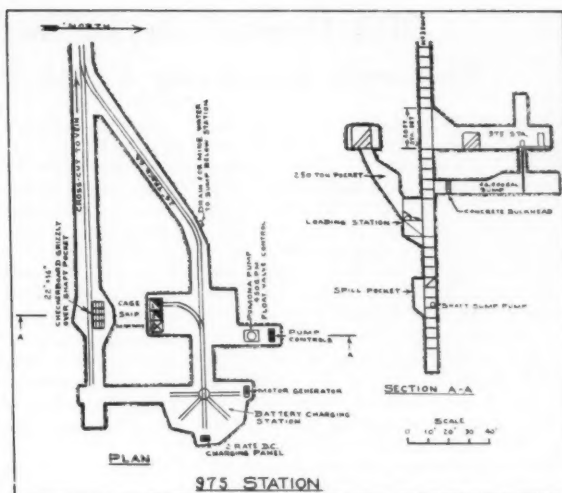
In preparing a stope above a haulageway for benching, chute raises are put up on approximately 250 ft centers. Air operated arc gate chutes are installed and a scam drift is driven 12 ft above the back of the haulageway. Grizzlies of 90-lb rail spaced at 12-in. openings are installed above the chutes. Manway raises are driven from the haulage drift to the scam drift near each chute and from the scam drift to the level above directly over each chute. From these raises subdrifts are driven to divide the block into benches approximately 30 ft in vertical measurements. The scam drift is slashed to the full width of the ore and 3 by 15-ft draw holes separated by 10-ft pillars are driven



Mine production from stope benches furnish 250 tons per day to mill



Adoption of this stoping method reduced dilution



Station provides ore storage, sump and charging facilities

on the footwall. These are connected above the level and the ore is slashed to full width. Benching is done with 62-lb jackhammers drilling 10-ft holes.

Some diamond drill blast hole drilling is done in hazardous or inaccessible places but it is avoided wherever possible because of the excessive amount of secondary breaking necessary. Holes up to 70 ft long are drilled with CP 55 machines using EXT bits.

All drifts, crosscuts and raises are paid for on a per foot of advance basis and contracts include breaking, mucking and pipe and track where required. Different rates are set up depending on size of headings. For raising, the rates are on a sliding scale increasing for every 25 ft of advance over 125 ft. Slashing and stoping are paid for on a cubic foot basis and all contracts are surveyed and settlement made twice a month.

After one year of service, employees are covered by group insurance to the extent of \$3,000 life insurance and \$15 weekly indemnity for 13 weeks. They are also covered for certain surgical benefits. Employees and families receive hospitalization benefits of \$4 per day for 31 days plus \$20 incidental expenses. This cost is borne entirely by the company.

A committee composed of representatives of the employees and the company meets bi-monthly to receive and discuss recommendations regarding safe practices. A well-equipped first aid station is maintained with a doctor on call and in attendance two afternoons a week. Accident cases requiring hospitalization are taken to Hanover, N. H. After one year of service, employees are entitled to a week's vacation with 24 hours' pay; after two years and up to five years, one week at 40 hours' pay; five years

and over, two weeks at 80 hours' pay.

Ventilation is maintained by means of a 3-ft Aerodyne fan with a capacity of 35,000 cfm at 3-in. water gauge driven by a 25 hp motor. This fan is located in the 975 level crosscut and discharges up the No. 3 shaft.

Development work is being carried on in the south end of the mine above the 300 level preparatory to mining a block of ore left by previous operations in the floor of the open cut. The 975 north drift is being driven to reach the top of the ore at that horizon. Surface trenching and diamond drilling will be carried on during the summer to explore for ore-bodies to the north of the present workings.

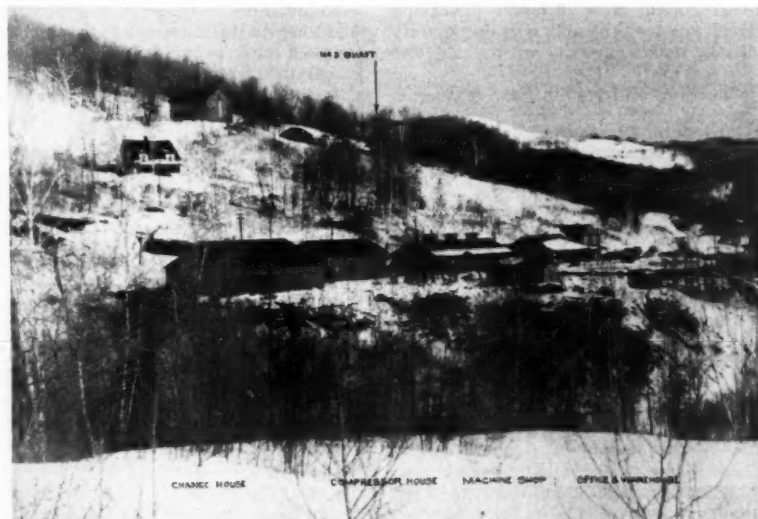
During 1949, the average production per month from the mine was 15,312 tons, the balance consisting of dump ore. Since the haulage from the dumps was completed in February the entire production has come from the mine.

The average underground crew for 1949 was 84.4 men per day. Production per man shift was 7.40 tons and broken 8.38. Mining is done on the day shift only and mucking and hoisting are done on both the day and night shifts. Mine supervisory staff consists of a superintendent, an assistant superintendent and three shift bosses.

Following are the mining costs from April 1, 1949, through December 31, 1949, based on the tonnage delivered from the mine.

	Per Dry Ton
Development and exploration	\$ .057
Stoping	.811
Pulling stopes	.330
Tramming	.259
Hoisting	.135
Drilling supplies & expenses	.085
Scraping & mucking costs	.090
Supervision & engineering	.159
Other underground costs	.246
Electric power	.204

\$2.394



Mine production comes from the No. 3 shaft on a five-day week basis



## Mill Operations Improved Through Crushing Plant Change

ERECTION of the present mill was begun in the late fall of 1942 and finished a year later. Milling began in October 1943 on a basis of 200 tons per day. This was gradually increased to 425 tons per day in 1947 and continued at this rate through 1948. During the first six months of 1949 this was raised to 500 tons per day and then to 750 tons a day in July when the enlargements were finished.

The work of enlarging the crushing plant and mill began in May 1949 and the work was finished by the 4th of July. By careful timing the machinery was tested and put into operation with a minimum of lost operating time.

Prior to this enlargement, the crushing plant consisted of two crushers: an 18 by 36-in. jaw crusher and a 3-ft cone crusher. The cone crusher was in closed circuit with a double-deck vibrating screen producing a 5/8-in. product that was conveyed to a fine ore bin with but 350 tons live storage.

### Changes Aim at Efficiency

In enlarging the mill, three objectives were to be attained: (1) to permit continuous mill operation on stored fine ore without the necessity of operating the mine more than five days per week (except for some incidental surface tramming); (2) to relieve much of the secondary blasting underground by installing a large crusher; and (3) to raise the grade of the copper concentrates by providing additional cleaning.

Because of the financial condition of the company, these aims had to be accomplished with a minimum of capital cost and shutdown time. This meant that the existing crushing plant had to be utilized in its entirety and be kept in operation until the last possible moment.

A new coarse ore bin and crusher

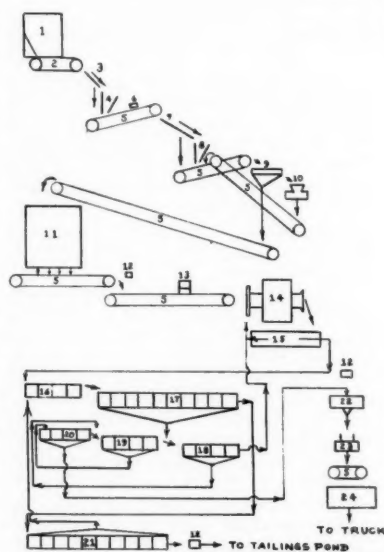
housing was built to one side of the ore delivery tracks so that no interruptions occurred as all tracks, etc., were laid, conveyor constructed and housed, and scalping screen placed over the 18 by 36-in. jaw crusher. Also, the fine ore bin was erected and the conveyor housing built without disturbing operations.

When all this work was completed the tram tracks were shifted, the fine ore conveyor extended over the new ore bin, feeders placed under this bin and the cut-over made. At the same time, the new flotation cells and filter

fed by a 42-in. apron feeder. The crushed rock is conveyed to a 3 by 6-ft vibrating screen with the 2-in. over size feeding the old 18 by 36-in. jaw crusher equipped with non-choking plates. The rest of the crushing plant has not been changed except to put a fine bowl on the cone crusher to make a half-inch product and extend the fine ore conveyor to the 32-ft diam by 36-ft high concrete stave bin. This storage bin had been built immediately adjacent to the mill, but on the opposite side from the crushing plant. This permitted the extension of the fine ore conveyor over this bin without the necessity of increasing the pitch. This bin gives 1500 tons live storage capacity.

In the mill four new 48-in. rougher

### FLOW OF ORE THROUGH COPPER CONCENTRATOR VERMONT COPPER COMPANY, INC. SOUTH STRAFFORD, VT.



### LEGEND

- 1 125 TON COARSE ORE BIN - 28 INCH GRIZZLY
- 2 10 FOOT X 40 INCH APRON FEEDER
- 3 4 FOOT GRIZZLY - 3 INCH OPENINGS
- 4 25 INCH X 40 INCH SINGLE TOSSLE, ROLLER BEARING JAW CRUSHER
- 5 24 INCH CONVEYOR
- 6 SUSPENDED HADNET
- 7 3 FT. 3 AFT. VIBRATING SCREEN 2 INCH OPENINGS
- 8 18 IN. X 36 IN. JAW CRUSHER - NON-CHOKING JAW PLATES
- 9 DOUBLE DECK (1 1/2 IN. AND 1 IN.) VIBRATING SCREEN
- 10 3 FOOT CONE REDUCTION CRUSHER
- 11 1500 TON FINE ORE BIN
- 12 AUTOMATIC SAMPLER
- 13 CONVEYOR SCALE
- 14 20 FOOT X 6 FOOT MARCY BALL MILL
- 15 78 INCH DOUBLE PITCH SCREW CLASSIFIER
- 16 4 - 48 INCH CONDITIONERS
- 17 10 - 48 INCH ASBESTOS ROUGHERS
- 18 4 - 36 INCH ASBESTOS CLEANERS
- 19 4 - 36 INCH ASBESTOS CLEANERS
- 20 4 - 36 INCH ASBESTOS CLEANERS
- 21 10 - 48 INCH ASBESTOS SCAVENGERS
- 22 40 FOOT THICKENER
- 23 6 FOOT-TWO DISC FILTER
- 24 250 TON CONCENTRATE STORAGE BIN

Plant changes improved operating efficiency

were cut in. But 20 hours' operating time was lost and this was due mainly to the small capacity of the old fine ore bin.

The new 25 by 40-in. jaw crusher is

cells and four 36-in. cleaner cells were installed to take care of the larger tonnage and provide one additional cleaning.

In the massive pyrrhotite of the ore,

### CALCULATED PRODUCTION TO DECEMBER 31, 1949

Calendar Year	Heads Dry Tons	% Cu	Heads Lbs Cu	Tails Dry Tons	% Cu	Conct. Dry Tons	% Cu	Conct. Lbs Cu	Ratio Rec.	Ratio Conct.
1943	17,046	2.17	740,267	15,462	0.44	1,584	19.06	603,697	81.59	10.76
1944	91,641	2.26	4,133,696	82,827	0.195	8,874	21.60	3,810,881	92.18	10.40
1945	82,943	2.43	4,024,632	74,572	0.17	8,371	22.56	3,777,718	93.86	9.91
1946	126,782	2.56	6,483,491	113,878	0.18	12,903	23.50	6,064,572	93.54	9.83
1947	146,396	1.69	4,936,613	136,829	0.16	9,567	23.49	4,495,054	91.06	15.30
1948	144,914	1.65	4,789,238	135,238	0.14	9,677	22.82	4,415,856	92.20	14.98
1949	222,630	1.58	7,022,313	210,623	0.22	12,013	25.37	6,094,908	86.79	18.52
TOTAL	832,358	1.93	32,130,251	769,420	0.19	62,989	23.25	29,262,686	91.07	13.20



the chalcopyrite occurs as finely disseminated grains in the gangues. The pyrrhotite content of the mill feed varies from 25-75 percent and will average 35 percent. The close association between the chalcopyrite and pyrrhotite makes fine grinding essential if a fair grade of copper concentrates is to be obtained although a low tailing can generally be made at a 65-mesh grind. The flow sheet shows the mill as it is presently being operated on all mine ore. The old mine dumps which furnished 55,000 tons from July 1949 to March 1950 have now been exhausted.

### Old Dumps Milled with Difficulty

These dump ores presented milling problems which were difficult to overcome. At the Ely mine, a glizzly and washing trommel with  $\frac{1}{2}$ -in. round openings were set up and the washed oversize hauled to the mill, a distance of approximately 13 miles. When weather permitted, washing the ore did not present too many problems but with freezing weather the dumps were hauled without washing or screening. Frequently portions of the dumps had caught fire so that much ferrous sulfate was formed. This resulted in extremely high acidity in the mill circuit requiring as much as eight lb of lime to the ton to keep the pyrrhotite from floating. This always resulted in higher tails sometimes going to .3-.4 percent. Hence, care had to be exercised not to include burned portion of the dumps.

In December 1949, hauling began on an old Elizabeth mine dump without any pretreatment other than adding two bags of lime to each truck load before dumping into the coarse ore bin. This aided the mill operators materially in their jobs of keeping the pH around 9.

Extreme care had to be taken in the amount of cyanide added to the ball mill as, in combination with depressing effect of the ferrous sulfate in the ore, high tailing would invariably result.

Since March 1, all ore is newly mined. Mill problems are greatly reduced although there is some variation in the ores coming from the different levels. This shows up in higher tailings and lower grade concentrate.

From the start of operations to December 31, 1949, the tonnages treated, assays, etc., are as calculated on the accompanying tabulation. It should be noted that the grade of ore has continually grown poorer. The higher tails in 1949 are due to the dump ores treated. The concentrate grade improved due to the addition of four cleaner cells making a third cleaning.

Addition of the new fine ore bin made possible a seven-day week oper-

ating schedule with the crushing plant operating only six days. This larger ore storage also helps in securing a better mixed ball mill feed. This was particularly noticeable when milling both mine and dump ore.

### Welding Extends Screen Life

The Elizabeth mine ore is not very hard but quite abrasive. Stationary jaw plates have a life of 200,000 tons. When worn the liners are built up in the company machine shop. The cone crusher liners are replaced after every 150,000 tons. One discovery of real interest was, that by welding every third wire intersection on the scalping deck of the double-deck vibrating screen, the life of the screen was doubled.

Ball consumption is 1.2 lbs or 10¢ per ton of ore. Forged copper-molybdenum alloy steel balls of 2½-in. diam are added daily. Manganese ball-mill liners wear as follows: shell

the first cleaner, there are no other reagents used in the cleaning circuit.

The tailings are impounded by building a dam with the sandy portion of the tailing. One four-inch sand pump is used to elevate the tailing for distribution on the levee. An area sufficiently large to retain several million tons is available near the concentrator.

During 1949 the mill handled 223,000 tons of ore, of which, 41,000 tons was highly oxidized dump ore. The operation showed a recovery of 86.8 percent on a 1.58 percent copper head and a concentrate assaying 25.37 percent copper. The last six months of this period averaged 21,200 tons per month reflecting the result of the increased plant capacity.

### Direct Milling Costs

The direct milling costs of the nine-month period from April 1, 1949, to December 31, 1949, are shown in the accompanying table.

	Cost per Dry Ton Milled
Crushing (Includes screens & conveyors).....	\$0.001
Grinding & classifying (Includes feed conveyors).....	0.173
Flotation (Includes pumps).....	0.145
Thickening & filtering.....	0.017
Tailings disposal.....	0.030
Plant water system.....	0.004
Assaying and sampling.....	0.027
Other milling expenses (cleaning, heating, research, etc.).....	0.043
Electric power.....	0.261
Supervision.....	0.024
Total Cost.....	\$0.815

liners, 190,000 tons, feed-end liners 125,000 tons and grate liners 310,000 tons. Total cost of liners per ton of ore is 3.4¢. Recently a set of Utalog shell and feed-end liners were installed. To date the performance of these liners has been most favorable.

### Reagent Consumption

The classifier overflows at 28 percent solids and contains approximately 50 percent minus 200 mesh. A small percentage is retained on 48 mesh and consists mainly of mica. The classifier circulating load is 600 percent.

The accompanying flow sheet explains the flotation circuit in detail. Addition of 0.025 lb of cyanide per ton of ore and 1-8 lb of lime is made in the ball mill. On freshly mined ore the lime consumption is 1-1.5 lb per ton. A pH of 9.3 is maintained at the head end of the rougher circuit. Pentasol amyl Xanthate is added in two places, 0.11 lb per ton in the conditioner and 0.01 lb per ton in the middle of the scavenger circuit. The frother consists of a 50-50 mixture of pine oil and pentasol 124 alcohol and is staged throughout the circuit as needed to a total of 0.05 lb per ton. Except for 0.13 lb of lime per ton of ore in

Of the total direct milling costs labor represents 28 percent and power 32.5 percent. These costs include all repairs, maintenance and replacements but do not include general overhead expenses.

Excluding the time lost when the mill was out of ore and power failures, the plant has 96-97 percent total operating time. Twelve men per 24-hour day operate the crushing plant, concentrator and tailing pond. On Sunday only six men are required (two men per shift in the concentrator). The mill foreman supervises all the major repair jobs and performs general maintenance work. A metallurgist has recently been employed to carry on research work and in a general way assist in the supervision of the mill operation. Only one assayer daily is required for all mill and mine work. The assaying has always been close to the monthly checks run by a custom assayer.

Two truck drivers are employed to haul the concentrate ten miles in company-owned trucks to Kendall, Vt., where it is loaded into box cars by a mechanical loader. Approximately one car a day is shipped to the Laurel Hill plant of the Phelps-Dodge Corp. on Long Island, N. Y.



General view of hydrogenation demonstration plant, Louisiana, Mo.

# Coal Preparation For Hydrogenation

**Bureau of Mines Plant Provides Pulverized Coal for  
Conversion to Liquid Fuel**

HIGHLY automatic methods are used in the preparation of coal for hydrogenation to convert Wyoming coal to gasoline and other liquid fuels at Louisiana, Mo. The pioneer pilot preparation plant uses full sized equipment so that the results of railroad unloading and crushing at the rate of 70 tons per hour and the milling and drying of 13.5 tons per hour will be representative of those anticipated from the operation of a full-scale plant. The new installation, located on the banks of the Mississippi River, has as its purpose the preparation of dried, pulverized coal. This product is supplied to the coal paste plant for subsequent hydrogenation

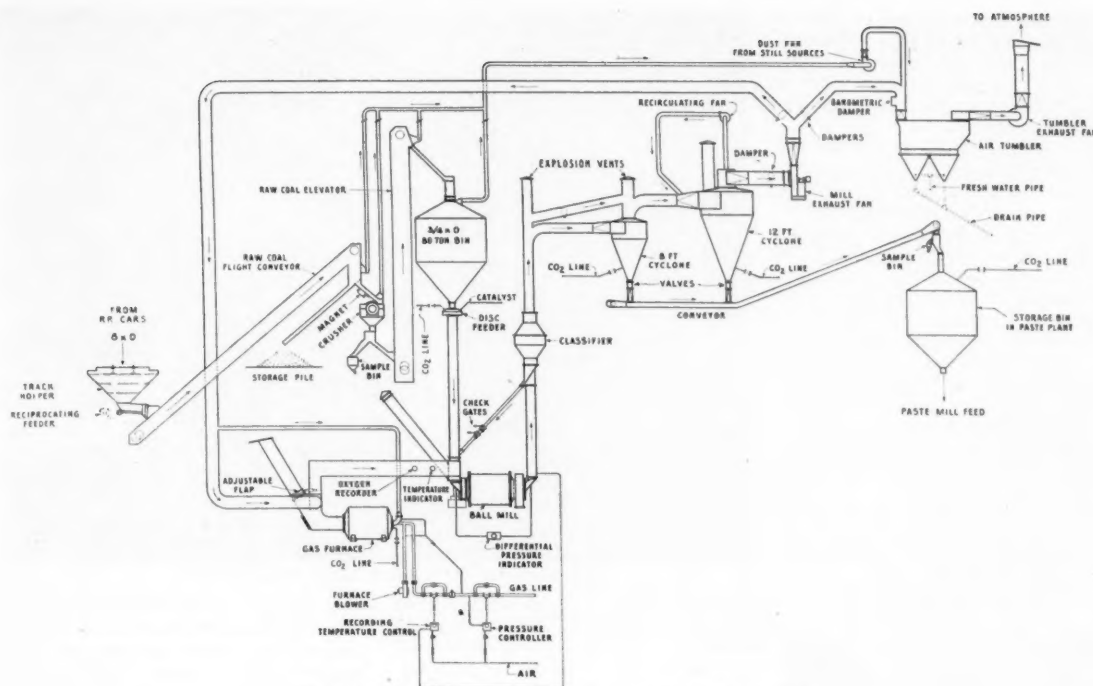
to produce high octane motor fuel in another section of the demonstration plant. The coal preparation plant also provides facilities for unloading and movement of the coal to the storage pile or through the plant on into the 60-ton coal bins in the paste plant where the dried-pulverized coal is stored until used.

Bituminous, sub-bituminous and lignite coals of varying preparation characteristics can be handled in the versatile plant. The railroad car unloading section has been designed to handle 8-in. R.O.M. at 70 tons per hour to the storage area or to the crusher where the coal is reduced to  $\frac{3}{4}$  in. top size. The pulverizing and



**By RALPH J. LOFQUIST**  
Contracting Engineer, Roberts & Schaefer Co.

drying stages have been designed to process 13.5 tons per hour at the  $\frac{3}{4}$ -in. crushed coal when this section draws speed from the 80-ton bin, the coal contains up to 30 per cent total moisture. The total moisture is reduced to two percent and the coal is pulverized to 99.5 percent minus 60 mesh with a minimum amount of minus 200 mesh material.



Flowsheet of plant that prepares the coal for hydrogenation

Raw coal is delivered in hopper-bottom railroad cars and unloaded through removable breaker bars with 8 by 10-in. openings into a track hopper. The reciprocating plant feeder feeds the coal to an inclined scraper conveyor which discharges the 8 by 0-in. raw coal to a rolling ring crusher. Tramp iron is removed when the coal passes over a magnetic chute. The raw coal is reduced to a minus  $\frac{3}{4}$ -in. and then passes over an automatic sampler, where the raw coal samples are taken to the foot of a bucket elevator.

Crushed coal is elevated to an 80-ton storage bin equipped with indicators to show high and low levels of the minus  $\frac{3}{4}$ -in. coal content. When the bin is full, the coal normally feeding the primary crusher can be run back to the storage pile for subsequent processing.

### Processing Plant

A disc feeder draws coal from the 80-ton bin for delivery to the pulverizing stage. The enclosed worm drive of this feeder can be adjusted to deliver raw coal to the ball mill at different rates. A variable speed motor which drives the feeder is controlled by an electric eye mill level control. Also, at the feed point, provision has been made to spray dissolved catalysts on the raw coal prior to pulverizing and drying.

Raw coal is fed to a Kennedy van Saun integral gear driven, inert-gas-swept ball mill where the coal is pulverized and dried in a single stage.

The ball mill load normally consists of ten tons of 3-in. balls. The ball charge is maintained at the proper level by adding balls when an ammeter indicator on the bench board shows that the charge has fallen below the ten-ton level. A special baffle plate at the mill trunnion insures that the incoming gases correctly sweep the mill.

Inert gas for drying and conveying the pulverized coal product is natural gas with a rating of 1000 Btu per

cu ft. For raising to the proper operating temperatures, the gas is passed through a steel shell furnace adjusted for pressure with an indicating controller and with temperature regulated by a proportionalizing controller. A combustion safeguard system insures proper ignition, burning and shutting down of the gas furnace with a minimum danger of explosion. To make certain that the oxygen content of flue gas remains below lower explosive limits, an oxygen recorder



Product collector and cyclone collectors operate in inert gas

automatically analyzes and constantly records and is set to give an alarm when safe limits are exceeded.

Furnace flue gas is tempered with recycled flue gas to build up the proper temperature and volume of hot drying medium to convey the 60-mesh coal product to the product collector cyclone via an expansion type classifier. In this latter unit, oversized particles are removed and returned by gravity through air locks to the ball mill for further grinding.

The product collector cyclone is of standard construction with the product discharged through a double discharge valve air lock. The flue gas from the product collector passes to the dust collector cyclone for reclamation of the finer sizes of product, thence, a part of this flue gas is recycled back to the inlet duct to the ball mill for tempering hot gases from the furnace. The balance, after passing through the mill fan, goes to a wet-type air scrubber where the cleaned gas is exhausted into the atmosphere by a fan.



Intricate piping system handles various materials and products

A specially constructed dust collector cyclone is equipped with a recirculating fan. The dust is discharged through a double discharge valve air lock. The mill fan exhausts inert gas from the furnace through the ball mill, classifier and cyclones. The damper at the fan inlet is remotely controlled for starting up the plant. The dampers at the mill fan exhaust "Y" are actuated by a piston-operated control drive that is controlled by a selector valve at the bench board to suit the amount of recycled tempering gases.

Dust laden air from still sources is collected by a tumbler exhaust fan. In addition to the air diverted to it from the "Y" branch at the mill fan exhaust, this air is passed through a



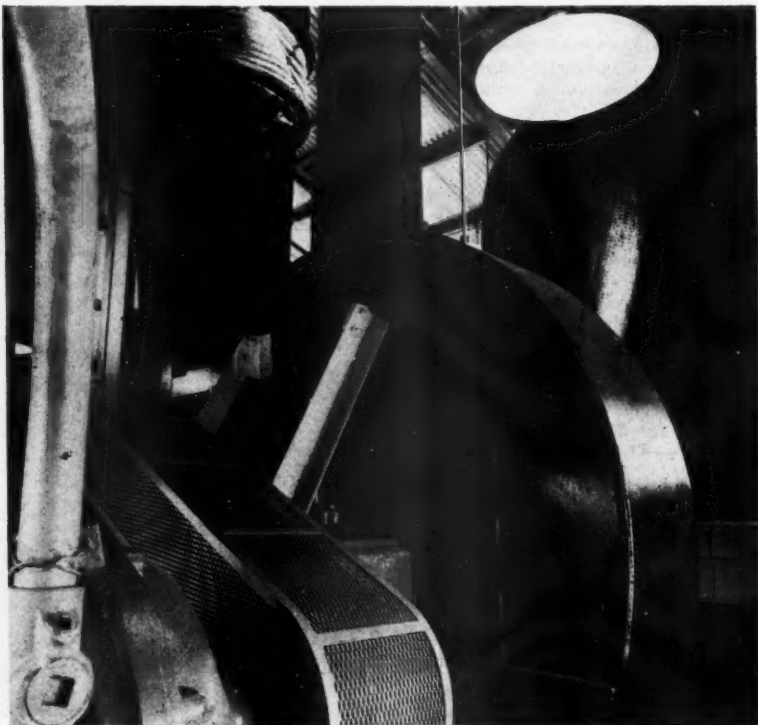
Primary crusher reduces R.O.M. to minus  $\frac{3}{4}$ -in.

horizontal type wet air scrubber. The fan runs at a fixed capacity with the variations of gas volumes from the mill fan compensated for by a barometric damper at the tumbler inlet.

### Coal-Oil Paste Feeds Hydrogenation Unit

The collected 60-mesh coal from the product collector cyclone mixes with the coal from the dust collector cyclone on a Redler conveyor. Both

products are carried to the paste plant and discharged to the 60-ton pulverized coal bin for storage over an automatic sampler where the finished product samples are taken. The dried pulverized coal is drawn from the bin at a low rate for mixture with a catalyst and with heavy oil obtained from the liquid-phase process. These ingredients form a viscous, 47-percent solids paste with which the hydrogenation process is started.



Mill fan pushes gas through wet-type air scrubber



Piping to handle both air and dust is of standard round section. This piping collects and eliminates dust, supplies recycled flue gas to the furnace, gas-conveys pulverized coal from ball mill to collectors and serves as venting to minimize effects of explosion in the pulverizer-classifier-collector system. All ducts carrying hot gas are heavily insulated as are the furnace, mill, classifier and cyclones. This insulation reduces the temperature drop in the recirculating system.

Precautions have been taken to minimize the danger of explosions from the heat-dried coal, air and gas mixtures. Safety devices and explosion vents are used throughout. Low-pressure nitrogen is used for blanketing the coal storage bin in the paste plant and at various points in the mill and drying circuit.

All motor starters are identified and mounted into a cubicle control center with sequence interlocking to insure starting the plant in proper order. If for any reason a motor driving a piece of apparatus should stop, the interlocking system will prevent spills by automatically stopping all motors driving units feeding coal to the shutdown apparatus. Push-button stations for all motors, temperature indicators, recording controls, manually-operated controls and instruments are mounted on a vertical-type bench board. Once started, the plant works automatically. This extensive use of automatic controls and instrumentation makes it possible to operate the plant with a small crew.



Ball mill and other equipment feature maximum of automatic control

Equipment for coal preparation and handling is housed in a 32 by 32 by 79-ft structural steel and corrugated cement-asbestos building with concrete floors and fireproof construction.

Although preliminary investigations indicate that high volatile, low ash coals are the most suitable for hydrogenation, the U. S. Bureau of Mines plan to test all types of Amer-

ican bituminous, sub-bituminous coals and lignite to determine their suitability for the hydrogenation process. The construction and operation of this unusual coal preparation plant marks the successful completion of one of the most important phases in the development of a process to produce liquid fuels from our extensive reserves of coal.



Coal preparation plant to the left and paste plant in center



Sullivan Concentrator incorporates 500-ton per hour sink-float plant to handle 3-in. mine run and return nearly barren backfill to the mine

# Sink-Float at the Sullivan Concentrator

Process Solves Problem of Ore Changes and Dilution

By H. R. BANKS

Mill Superintendent  
Consolidated Mining & Smelter Co.  
of Canada, Ltd.

THERE is a catchiness to the phrase "Sink-Float" which has probably added greatly to the interest which the public has given to this concentrating process presently being employed in an ever-widening degree. To the mill man who saw the startling introduction of froth flotation from among his jigs and tables and buddles and vanners, it comes as a mild palliative to realize that once again the difference in specific gravity as between the wanted and unwanted particles of ore has become a method of concentration and, that through this modernized jig, a practical and economical separation can be effected. He feels that after all he was dealing with forces which, though temporarily thrown into the discard of "old fashioned," have again been brought out upon the modern stage.

There is something very positive about the force of gravity. There is no need to excuse the actions of this all-pervading instrument by a need for conditioning or filming or the empirical adding or subtracting of an endless number of reagents. Gravity is continuously and constantly on the job!

The part which the mill man plays in the sink and float process is to so devise his plant that he can control the feed as to fineness and to maintain the proper characteristics of the medium. The first of these demands a thorough and careful screening while the latter can be controlled to definite standards. Both functions must of necessity be carried out at a minimum of expenditure.

From the commencement of operations at the Sullivan Concentrator

there has always been a weather-eye cocked for possible improvements in the process. Jigs, tables, centrifugal concentrators, etc., have all been tested but the massive sulphide ore which comprised the Sullivan gave little opportunity for gravity concentration. In the early years of Sullivan Concentrator history the insoluble content of the ore was as low as 6 percent.

Changing characteristics in the ore body as greater depth was attained brought about a different picture. To this was added the probable dilution of the ore with the mining of the pillars.

The milling rate was due for an increase since the diluent was largely siliceous material. To meet the needed increase through conventional equipment would have meant proportionately greater increases in equipment than the changing tonnage requirements would indicate.

Since the increase was largely siliceous material the principle of sink and float appeared to have an application. Experiments were started to check the feasibility of this system of concentration.

## Scale Tests Prove Application

Among the features of this process is the definite ability to translate test results (provided the sample submitted is representative) into reliable operating figures. Where the density of the medium can be obtained with a heavy chemical there is no question as to the accuracy of the test work. Mechanically suspended particles of galena or ferrosilicon as a medium are



Primary ball mill floor at Sullivan

somewhat more difficult to use. We found that bucket tests gave dependable results.

The following is a typical bucket test:

	% Weight	Pb %	Zn %	Fe %	Insol. %
Feed	100.00	7.1	6.3	24.3	38.0
Sink	48.0	10.6	9.1	33.7	18.0
Float	24.0	0.19	0.29	4.5	81.0
Fines	28.0	7.3	6.5	25.3	36.0

### Float for Mine Backfill

The point of application was given much consideration since it is obvious that if you are to discard some part of a product any unnecessary retention of the discardable material is to be avoided.

The first site investigated was at the coarse crushing plant adjacent to the 3900 Portal and some 2½ miles from the mill. Here the mine run was reduced to 3-in. size; a practical size for the process and float elimination was approximately the same as from the Symons crusher discharge, the product finally adopted.

The need for backfill for the mine plus the fact that a small percentage of iron sulphide tailing would react to solidify the float and the desire to increase the efficiency of the haulage system by providing loads both to and fro opened the way for the construction of the new plant adjacent to the concentrator.

The product chosen as feed to the sink-float plant was the Symons discharge at approximately 1½-in. size. To crush finer before sink-float means that more untreatable fines would be produced and the over-all float elimination would be lowered. The choice of medium and the equipment was given much study. The availability of lead concentrate in such measure as to allow us to make a medium of any desired fineness and to turn it back for replacement before it "wore out" was one of the determining factors in the choice of galena medium.

In the final analysis the sink-float process is summarized as follows:

- (1) Screening and washing of the feed to take out that material too fine for sink-float treatment. It was decided to start at plus four mesh and follow down

with finer screens as the process developed.

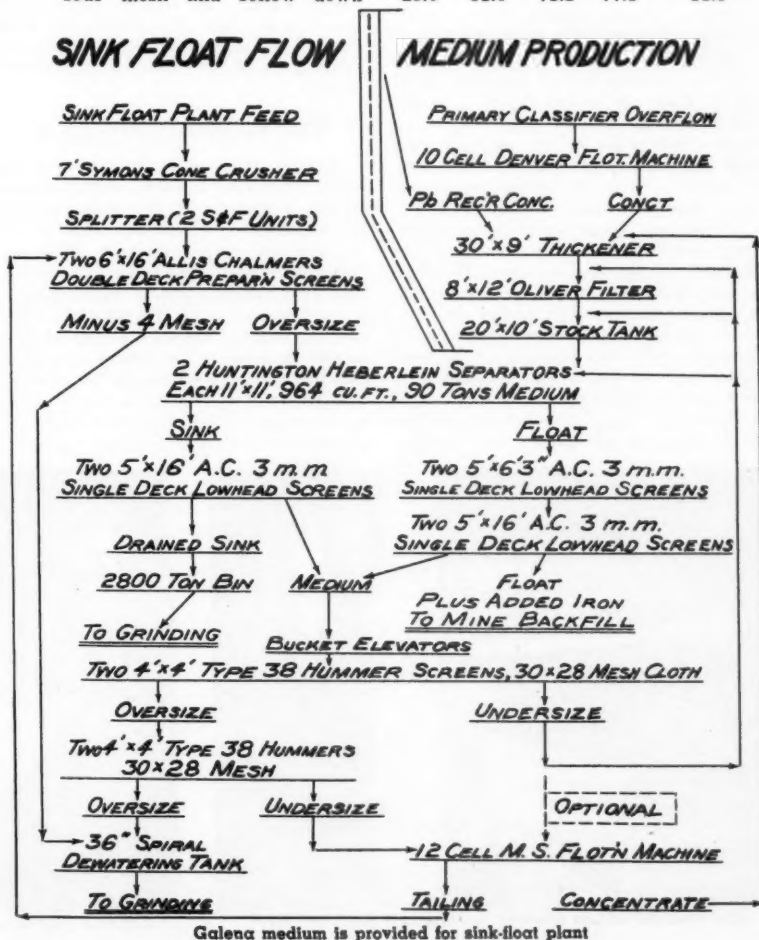
- (2) The actual separation.
- (3) The recovery of the medium from both products
- (4) The preparation and upkeep of the medium

There are possibilities for improvement in the application of the equipment. Screening at 1-in. size and at 500 tons per hour is a major operation. The draining and washing of the sink and float products is of similar proportion and must be thoroughly done, particularly in the case of the float since the return of lead concentrate to the mine with the backfill would hardly bring any cheers from management! Metal content of backfill is about 0.2 percent lead and 0.3 percent zinc, a result comparable to the test work.

### Feed Preparation

The plant is fed from a 6000-ton receiving bin served by a 30-in. conveyor. The feed, the product of a 7-ft Symons cone crusher, has the following average screen analysis:

+¾"	+½"	+¼"	+4 Mesh	+6 Mesh
28.0	51.6	71.2	77.8	81.8



Galena medium is provided for sink-float plant



Feed preparation is extremely important. Unless this part of the process is carried out efficiently there will be great difficulty in keeping the medium in proper condition. Unless the feed is properly screened of fines and drained to a constant moisture, the fine materials and the excess moisture will upset the medium.

Feed is delivered to a splitter that divides the stream into two parts, each to serve identical sections of the sink-float plant. The splitter is a simple hinged plate with hard surfaced edge. The feed passes by chute to the low-lead, 6 by 16 ft, Allis Chalmers double-deck screens. The lower deck of the screen is equipped with four screen sections 6 by 4 ft. The first section is a Tyrod wire screen at 0.147 by 3 1/2 in. and .12-in. wire. The next two sections are 7/32-in. punched plate and the final screen is 3/16-in. space cloth—square wire mesh.

The upper deck is made up of four-screen sections; the first three sections are of punched plate at 9/16-in. square holes. The fourth screen is a space cloth with 9/16-in. aperture. The life of the screens is approximately three weeks, varying between one week and five weeks. Screening efficiency is about 94 percent.

This wear factor is high and longer screen life is sought by such changes as the substitution of punched hard alloy plate or some other product for the effective but rather vulnerable wire screen cloth. Better use of sprays will serve to offset some of the lost efficiency—Such problems serve to keep us young and out of mischief!

From the preparatory screens the feed passes to a draining chute. The moisture of the feed entering the separator is approximately 1 1/4 percent. A wedge-wire screen insert in the chute bottom has proved both an effective draining measure and has stood up remarkably well to the abrasive action of the ore.

There are two simple devices in the feed chute to which we may credit



Float returned to the Sullivan mine for backfill contains approximately one-half percent combined lead and zinc

the effectiveness of the drainage and the relatively light wear. At the bottom of the feed chute a hinged plate projects at an obtuse angle that can be varied. A weighted sheet rests on the surface of the ore. This is composed of three sections of 30-in. conveyor belting to the underside of which is bolted 2-in. angle irons. The combination of the weighted sheet and the hinged plate so inhibits the free flow of the ore as to permit time for drainage and to minimize the chute wear.

### The Separation Process

A tank, 11 by 11 ft, tapered to connect with an elevator whose casing is 3 ft 3 in. by 4 ft 1 1/2 in. serves as the separator. It contains 964 cu ft of medium, approximately 90 tons. The float is projected toward the overflow lip by three rotating paddles with a normal speed of 4 rpm, but this can be varied. The immersion of the paddles is 5 in. so that there is a definite boosting of medium and float over the lip at a controllable rate. The float is laundered to the float drainage and washing screens.

Sink passes downward to a sink elevator by which it is raised above the level of the separator in buckets perforated to permit the medium to drain back. The sink is fed to the sink washing screens. The bucket elevator travels at a speed of 35 fpm. Buckets are 30 in. long and projection and depth are each 10 in. The buckets are continuous with a 2 1/2-in. spacing and are carried on a 4-in. pitch chain.

### Medium Recovery

The undiluted medium is drained away from the sink and the float products and, passing over a 4 by 4-ft Hummer screen fitted with 40-mesh cloth, returns immediately to the separators. Washings from both sink and float washing screens is also fed to a 4 by 4-ft section mounted in the same Hummer screen frame. Oversize from both screens joins the undersize from the original ore preparation screens and goes to the mill grinding circuit. Undersize from the second section of the Hummer screen goes to a 12-cell, 24-in. Minerals Separation flotation machine where the lead concentrate is floated off. This is ele-



Sink washing screen removes medium and produces grinding plant feed



Flotation produces sulphide concentrate for refining at Trail smelter



vated to a 30-ft Hardinge thickener.

Flotation machine tailing is used as first spray water for the ore preparation screens. Undersize from these preparation screens is pumped to the mill circuit by means of a 6-in. Wilfley pump.

The clean water used in sprays on the final sections of the product screens goes to a 5 by 4-in. S.R.L. pump that delivers to a steady head tank above the product screens. The water first used as final wash is used again as a first wash on the product screens. It is pumped by S.R.L. pump to the second section of the Hummer screen and thence to the flotation machine as previously mentioned.

The final washings on the preparation screens are carried out by clean water which, after passing through the preparation screens, goes to the mill via the Wilfley pump. Undersize from the preparation screens, amounting to about 28 percent of the initial feed, is pumped to the mill circuit at from 40-45 percent solids. This, therefore, is a measure of the water coming into the plant.

## Medium Preparation and Upkeep

There are three characteristics that jointly govern the effectiveness of the medium, density, viscosity and stability. Density is controlled by sampling and weighing, using a standard density bottle. Variations are corrected by adding heavy medium or water. The density found most suitable is 2.97 as the medium enters the separator but the actual effective density is some four points below this, viz 2.93. It is assumed that the dilution is carried over from the film of water clinging to the ore as it enters the separator. The same density (2.94) is present in the medium overflowing the elevator casing weir by which a constant level is maintained in the separator. This, therefore, gives proof of the uniformity of the medium within the separator chamber since the medium overflowing the weir derives from the bottom of the chamber.

This uniformity of medium density when associated with uniformity of viscosity and stability in the medium is naturally an all important point in the success of the operation.

Viscosity, that characteristic so well illustrated by molasses at different temperatures, is measured by a simple capillary viscometer and against water at unity. The viscosity limits within which we have been operating are from 1.2 to 1.6. The lower limit is naturally preferable but must ride tandem with stability.

Stability is measured by a settling test in which the rate of settlement should not be faster than 4 cm in 20 minutes in a 1000 cc graduate. Stability in the medium complements viscosity and a constant combination of



Careful pulp control is a prerequisite for efficient separation

these two must be sought for the ideal medium.

Medium is derived from two sources:

- (1) A product floated from primary classifier overflow whose screen analysis is:

+200	+260	+350	+460
14.3	24.3	22.1	16.6
+670	+1000	+1500	—1500
10.1	5.2	4.0	3.4

- (2) The regular final concentrate whose screen analysis is:

+200	+260	+350	+460
0.6	4.0	12.8	17.6
+670	+1000	+1500	—1500
16.6	14.0	8.8	25.6

When, therefore, stability or viscosity are out of gear, medium may be drawn from either source to make the correction.

Flotation concentrate resulting from the cleaning of the medium is delivered to a 30-ft thickener where it joins the new medium brought from the mill. Thickener underflow is pumped by 4-in. Denver diaphragm pumps to an 8 by 12-ft Oliver filter. Filter cake discharges to a 20-ft diam heavy medium tank. The density of the medium in this tank is maintained at 3.3, leaving control of the medium to a single addition of water. This control is possible to plus or minus 0.01.

The rate at which the medium is carried through the circuit is adjusted by a butterfly valve situated immediately below the Hummer screen. This valve directs the medium to the feed pocket of the separator and the degree of closure of the valve regulates the speed of the medium. The hopper above the valve is slotted to take care of any overflow to the stock tank.

Since adoption of a weekly shut-down at the Sullivan Concentrator, it is necessary to provide storage for the medium over the week ends. This is done in two storage tanks 15 by 9

ft high. These are fitted with agitator arms that can be lifted clear of the medium and can be lowered to bring the medium into suspension on starting up again.

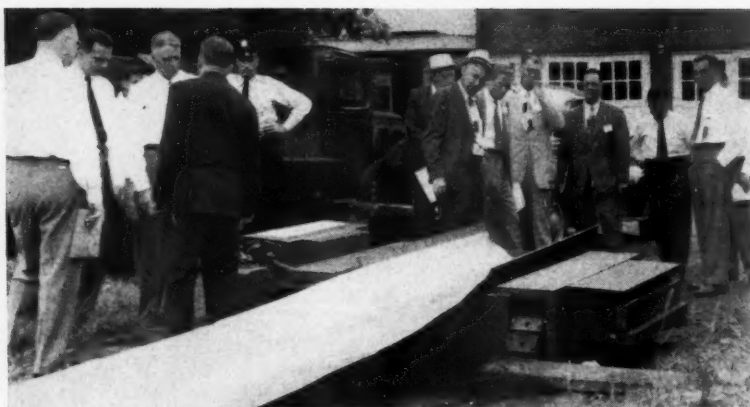
## Instrument Control Planned

When the customary growing pains of a youthful plant have been surmounted, time will be devoted to a study of instrument control. The medium and the process as a whole will lend itself readily to control by instrument.

The building in which the sink-float plant is housed is a steel frame structure 58 by 70 by 52 ft high. The siding is Robertson "Q" panels, and the roof laminated 2 by 4. There are no windows. The sink is conveyed to a 3500-ton storage bin serving the rod mill or primary mills. The float is also conveyed to a storage bin from where it is drawn for loading the cars returning to the mine. An Oliver filter 12 by 8 ft is used to prepare the iron sulphide added to the float for backfill cementing.

Introduction of sink and float to the Sullivan Concentrator flow sheet has proved to be a definite benefit. It is too early yet to gauge the full impact of this process on the previous concentration scheme but there has been sufficient evidence to show that the removal of a generous portion of the hard siliceous material from the feed will yield excellent dividends in reduced wear, finer grinding and improved over-all metallurgy.

The production of what promises to be excellent material for backfill, the driving of a new tunnel to serve an underground crushing chamber and the introduction of electric haulage direct from underground storage bin to concentrator receiving bin, all adds up to the beginning of another stage in Sullivan operations.



Members of advisory group met at Huntington on June 23 to see the conveyor in operation

# Haulage For Continuous Mining

**Test Unit Developed by BCR Mining Development Committee Combines Principles of Shaking Conveyor and Steel Belt Trough**

CONTINUOUS face haulage has been recognized as one of the most important elements of a continuous mining operation. The Mining Development Committee of Bituminous Coal Research, Inc., has long been concerned about this problem, and last September, after their continuous mining machine had progressed to the test stage, they authorized fundamental development work on face conveying. H. E. Smith, MDC project engineer, was assigned the job of conducting fundamental studies and several theoretically probable solutions to the problem have reached the point of working scale models. These include: (a) a flexible conveyor; (b) an extensible conveyor; and (c) a combination extensible-flexible conveyor.

The flexible conveyor model was built to study the problem of conveying around a corner. This proved feasible and an extensible-flexible conveyor was built along similar lines which, however, offered a variety of complications. It is felt that these complications can be worked out, but meanwhile to meet the immediate needs of the industry, it was decided to evolve an extensible conveyor.

From the experience with stainless steel belts, the committee felt it would be possible to combine the principles of the shaking conveyor and a steel

belt by using a steel strip as an extensible shaking trough. The strip would have a total length of say 300 ft; it would be rolled on a spool with a portion unrolled and extending toward the face to serve as a conveyor trough. This would be supported on rollers spaced at intervals in the same manner as is used with the conventional shaker conveyor. The steel roll would be mounted in a standard shaking conveyor head that would impart the reciprocating motion both to the

spool and to the extended part of the conveyor trough. The spool end would be the discharge end with suitable plates or chutes to direct the discharging coal into whatever transportation unit was employed. The front end of the steel strip would receive coal from the continuous machine. This end would be mounted on a self-propelled unit that would move forward as the working face advanced, pulling the strip off the roll to extend the length of the shaker trough. When this had reached its limit, the steel belt would be rewound on the roll; the entire unit would then be moved ahead to its new position and the operation repeated.


The application of the shaker principle would immediately reduce the alignment problem since it would be dealing with a reciprocating trough rather than an endless belt. This would also overcome the complication of storing a sufficient quantity of conventional conveyor troughing in the available space. By using flexible strip steel for the trough, 300 ft of this strip steel could be coiled onto a drum 20 in. in diameter.

A full-scale conveyor is powered by a conventional shaker drive connected to a slender spool on which is rolled 300 ft of the flexible trough. The spool is mounted in bearing blocks that slide in aligning slots on a base plate. This was done in order to keep the time and expense involved in tailor-made parts to a minimum. The loading end is made up on the chassis of a small cat truck. The saddle is mounted on pins to allow for uneven bottom and grades and has an aligning device to take the loading boom of a conventional loading machine or mining machine.

This conveyor is already undergoing tests. Initial experiments are expected to be finished the middle of July, at which time it will be taken to the mines to handle the output of BCR's continuous mining test unit No. 2.



Conventional shaker drive is used to operate the reciprocating steel belt conveyor



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Bringing out a train with the inverted trolley system. The operator gives full attention to locomotive controls

# Modern Haulage System Serves New Mine

## Inverted Trolley Offers Safety and Production Advantages

By SCOTT R. WOLFE

General Superintendent  
Cannelton Coal & Coke Co.

NEAR Smithers, W. Va., the Cannelton Coal & Coke Co. is driving its new Lady Dunn Mine No. 100 portal using a unique inverted trolley system that has proven to be completely successful. Because of its unusual features, this inverted trolley wire and slide combination is worthy of the serious attention of all operators using track equipment.

This new portal is a part of a modernization and expansion program aimed at increasing tonnage from the present 3300 tons per day to approximately 6000 tons per day. In conjunction with this increased output, a new 800,000-ton per annum cleaning plant will be built on the New York Central Railroad line on the north side of the Kanawha River. This plant is now in the ground-breaking stage and is scheduled for completion by July 1, 1951.

Face operations, gathering and main line haulage is conducted with track-mounted equipment. Hand-held drills are used and track-mounted universal cutting machines cut the kerf. Originally, the new Lady Dunn Mine No. 100 portal was equipped with a con-

ventional trolley system. The eight-ton locomotives all carried the familiar trolley apparatus and the haulage system was subject to the same dangers and disadvantages apparent in all installations of this type.

Studies of fatal accidents over the four-year period 1945-48, by the Accident Prevention Commission of the West Virginia Department of Mines revealed that either the trolley pole or the "nip" caused 18 percent of the fatalities and 6 percent of the non-fatal injuries to motormen in the mines of the state. In the year 1948 alone, 82 non-fatal injuries were chargeable to either the trolley pole or the nip.

Recognizing the need for improvement, L. H. Hawkes, a former employe

of the Cannelton Coal & Coke Co., devised a method of using conventional trolley wires inverted to employ a specially-designed slide and hook, which will be called a "slook," a combination of the two words, that would eliminate the dangers inherent in conventional trolley equipment. At the instigation of F. O. Harris, vice-president and general manager, W. T. Hawkes, mine superintendent, J. S. Kern, mine foreman, and the author, it was decided to give this unique method a tryout.

During the recent UMW imposed shutdown, the installation was made. The inverted trolley system was given its first actual test on March 8, 1950, and has been in continuous operation ever since.

## Device Receives High Praise

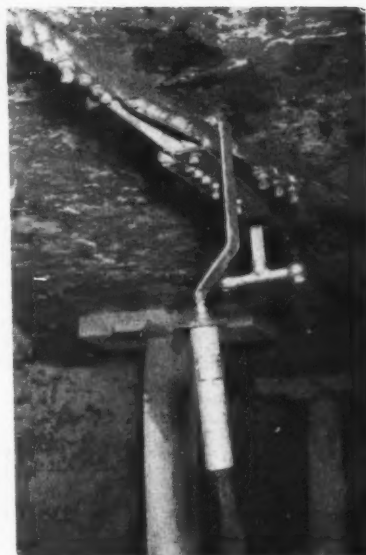
Both the motormen and the supervisory personnel of the Lady Dunn Mine No. 100 wholeheartedly subscribe to the inverted trolley system as a great success. As evidence of the acceptance of the new system, a motorman close to pension age remarked, "I've been working here for years with stiff arms, been jerked out of motors, been blinded by sparking nips and now that I am about to retire, you come along with something worth while."

In the present arrangement, the installation uses a standard L-type trolley hanger with the clip inverted. An extension 3-in. long is inserted between the expansion shell of the hanger and the crosspiece, so as to spot the trolley wire about 2 in. from the top. The unique patented "slook" which slides freely on the trolley wire replaces the conventional trolley pole and roller or slide.

Two frogs have been in successful use since this equipment was first employed. The relation of the track frog to the trolley frog and the cable length is of importance to make certain that the "slook" follows through in the direction of the motor when switching.

When first tried out, the "slook" tended to jump from the trolley wire but this difficulty was soon straightened out by scraping off the rough "barnacles" that had formed on the wire by sparking of the previously used trolley roller. Once these rough spots were removed, the "slook" moved freely along the wire almost completely free from sparking except for a minor amount that occurred when passing through a frog.

The unique design of the slide is such that all pressure is down on the trolley wire. The slide is constructed so that it is always in contact with the wire and even when gathering with cable-reel locomotives, no attention need be paid to the "slook."



"Slook" slides through slot in frog

## Many Advantages Offered

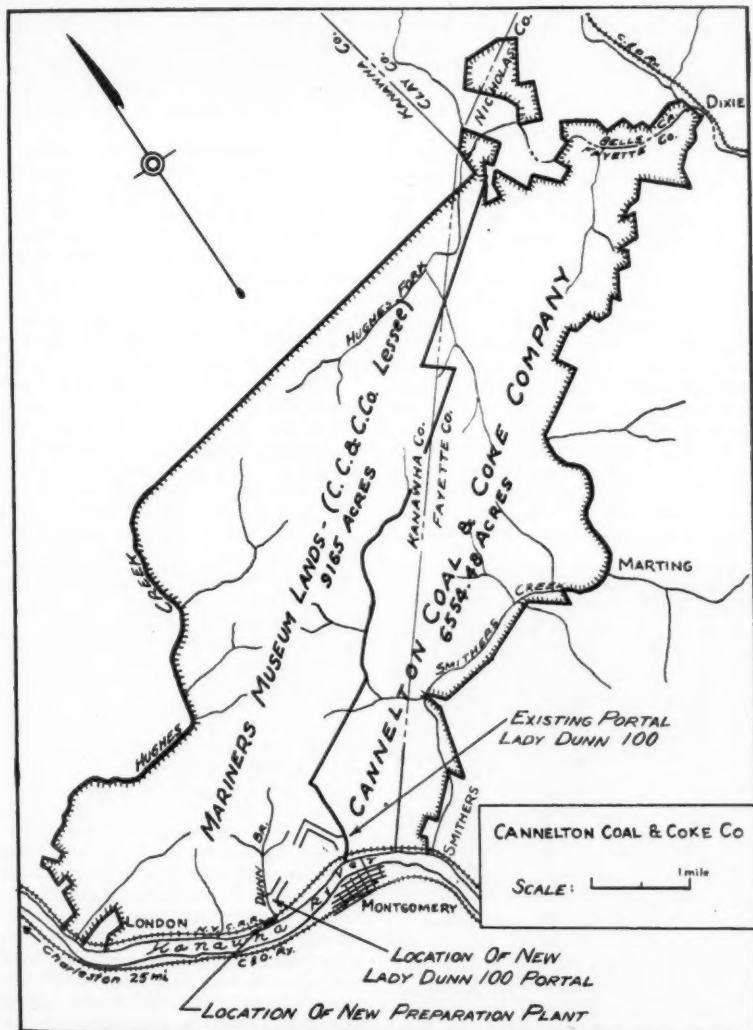
Dominant advantages of the new system have been to improve haulage safety. However, from the operating viewpoint, installation is also simplified. There is no need to hold the trolley wire up as, once placed in the clip, gravity holds it in place until the clip is tightened.

Numerous other advantages are apparent. Motormen are completely free from groping for the wire with the trolley pole. The danger involved in "dogging" the pole—reversing trolley pole direction—in low coal is eliminated. No time is lost as the "slook" works well against a stop on the trolley line when the locomotive is used in gathering, and works equally well when turning off to gather coal in either direction.

One of the most important advantages offered by the inverted trolley is that it frees the motorman from any fear of danger from the "slook." The hazard of splintering poles is gone. The motorman remains firmly seated at all times and always has both hands available to operate controllers, brake wheels and sand levers. Thus the danger of motormen falling out or being knocked out of their seats is reduced to a minimum. This feature alone is a most important factor in accident prevention.

Higher speeds may be maintained with greater safety. Should the "slook" hang up, a Miller-type plug disconnects the "slook" from the locomotive and no damage is done. Slides are used to move cutting machines without the need for a man standing by to constantly move a nip to provide power. Sparking, as from the use of the conventional "hot-hook," is entirely absent.

The inverted trolley systems offer a greater freedom of danger from



Extensive holdings assure long productive life





J. S. "Dan" Kern shows how the safety plug disconnects in the event of a "hang-up"

falls. Small rocks won't knock out the trolley wire. Considering that the new system will develop full power and be more economical in power consumption, one qualified authority stated that the "power savings alone would make it worth while for any big operation to change over to the inverted trolley system."

### Lower Maintenance Costs

Maintenance costs on operating equipment should be greatly reduced with the use of the inverted trolley. The almost complete absence of the jerking caused by trolley sparking reduces the strain and wear on gear trains, pinions, keyways and shafting. The high cost of trolley-pole and nip replacement is eliminated. Further data will be developed as the equipment is used, but all indications point to lower maintenance costs as compared with those of the conventional trolley.

Anticipated savings include reduced costs for replacing controller segments, brushes and brush holders. Fuse blowouts will be less frequent as power cut-offs and cut-ons caused by sparking will not occur.

### Simple Design Featured

The equipment now in use is hand-made or adapted from existing trolley gear. Standard frogs have been modified to provide a slot for passage of the balanced, fused "slook." The manually-operated power switch cutting off the supply of 250-v, d-c current was cut down in width to allow passage of the "slook" hanger.

The trolley hanger now in use is a makeshift arrangement utilizing standard equipment. The manufactured product will be cast in a single unit with a simplified clip. A convenient place will be provided on the hanger for a take-off for lighting and other purposes.

Present plans call for installation of the inverted trolley system in all haulageways of the Lady Dunn Mine No. 100. Approximately 2600 ft of entry must be driven to connect with

existing workings. A double-track will be carried the entire length of the entry. When the connection is made, coal from the new portal of the Lady Dunn Mine No. 100 will move directly to the new tippie in 157 cu ft cars hauled by 15-ton tandem locomotives. At present, coal produced while driving the entries is trucked to a central tippie which also screens and crushes output from Mines 3 and 5.

### Long Past—Bright Future

Although the foregoing material is of special interest, it is significant that this installation is being made at a property with a long history and an important future. The original grant on the lands now being mined were dated 1796. Prior to 1857, cannel coal was mined and barged down the Kanawha River to a point where it was used in the manufacture of "rock oil." The first production was taken to the surface in sacks and baskets; later, oxen were used to draw the coal out on sleds. Eventually small cars on wooden tracks were used for coal transport. At one time, prior to the Civil War, slaves were worked in and about the mine.

Cannel coal mined on this property came from a seam located high on the mountain, 700 ft above the river level. One of the principal uses of the cannel coal was for illumination. The chips of cannel coal were placed in large iron baskets with small openings at the bottom to admit air. It is recorded that, in the construction of the No. 2 locks on the Kanawha River, all night work was done by means of illumination from this source. When the discovery of petroleum killed the coal-oil business, coal from the Cannelton operations was used for the production of gas.

In 1888 a narrow gage railroad was built to handle the coal from one of the mines. Grading exposed the No. 2 Gas seam which was immediately opened up with a mine. This original

Mine No. 1 of the Cannelton Coal Co. of W. Va., opened in 1888, was practically worked out in 1936 after 48 years of operation.

By 1898 the high value of the No. 2 Gas coal was recognized both for by-product and metallurgical uses and by 1908-1909, the reputation of this coal was fully established. In 1910 the Cannelton Coal & Coke Co., a subsidiary of the Algoma Steel Corp., Ltd., of Sault Ste. Marie, Ontario, Canada, was organized for the purpose of providing the steel plant with an assured supply of Smithers Creek metallurgical and by-product coal. To meet the demands of the parent company, output of coal from Cannelton operations was rapidly increased.

In 1910, Mine No. 2 was opened and the No. 2 tippie was built in 1911 to take care of its output. Production from the two mines totaled approximately 5000 tons per day. In 1916, demand was at a high point and output from the Cannelton properties reached approximately 1,250,000 tons. Production slumped during the abnormal conditions following World War I but then gradually increased until 1949, when a strike closed practically all the mines in the Kanawha district.

In the later years of the history of the Cannelton property the trend has been to develop mining areas in thinner coal as the thicker seams were worked out. Coal in the thin seams is of exceptionally high grade. There are, however, some blocks still to be mined in the thicker coal. Today the company holds, in combined fee and lease, 16,000 acres containing approximately 80,000,000 tons of coal.

Upon completion of the new Lady Dunn Mine No. 100 portal, the entire production of the mine will pass over a graded track about 0.4 mile in length to a new head house located on the north side of the highway. From the car dump, belt conveyors will move the coal to the new preparation plant. The coal will be crushed to 5 by 0 in. and passed through an eight-cell, three-compartment jib, thence over dewatering screens. Fines will be dried in centrifuges and remixed and loaded in railroad cars by a mixing conveyor. Coal from other mines in the Cannelton area will also be processed. A track hopper and elevating belt conveyor to the cleaning plant will be incorporated.

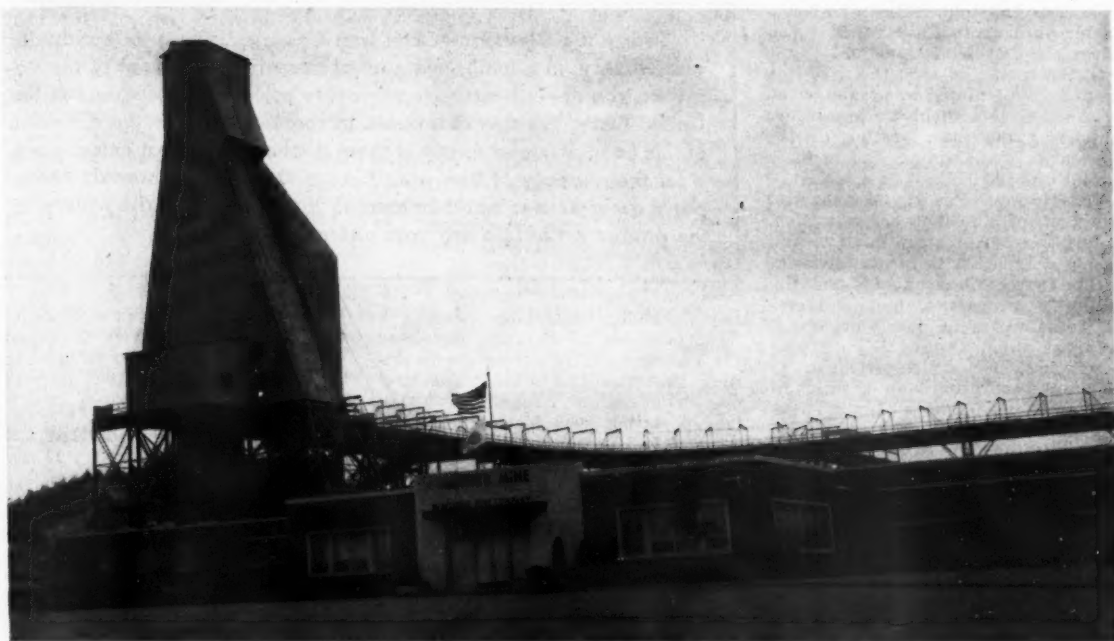
The 450 tph plant will operate two shifts per day throughout the year. Coal will be stockpiled in two 200,000-ton piles when Great Lakes shipping closes for the winter. Rejects will be disposed of in an adjacent area.

This project, and especially the inverted trolley system, deserves the attention of all mine operators. As the advantages already apparent are borne out in longer experience, other new mines will be interested in the adoption of this safer haulage method.



Trolley line, frog and "slook" of the "upside-down" trolley system





Headframe of the Mather mine, producer of over a million tons of iron ore in 1949

# Pioneering in Iron

## A Major Ore Producer Completes First Century of Service

By ERNEST KIRKWOOD

Cleveland-Cliffs Iron Co.

PROSPECTORS throughout the United States made important discoveries of copper, iron and gold in the nineteenth century and it was in the middle of that period that the beginnings of the Cleveland-Cliffs Iron Co. took form in the young State of Michigan. In its century of operations, the company has increased production of iron ore from an output of 3000 tons in 1854 to a total of over 7,000,000 tons in 1949.

Michigan was admitted to the union in 1837 following careful geological and linear surveys. Douglass Houghton, first geologist of the new state, exhibited a vigorous interest in investigating the mineral wealth of the upper peninsula region and conducted extensive examinations there. His formal report, however, stated "I am led to the conclusion that the only ores of the metallic minerals . . . which can

be reasonably hoped to be turned to practical account, are those of copper."

It was the day of the prospector. Although Houghton recorded his findings guardedly, prospectors stampeded to file claims in the upper peninsula. There was great speculation in copper stocks and fortunes were made and lost over night. The movement to the north had started and the urge to explore and find mines, grew rapidly.

Certain lands bordering Lake Superior had been signed over by treaty to the United States. Applications made to the Federal Government for permits to explore for and produce copper were granted for use as soon as the region was surveyed and subdivided into townships and sections.

A survey party headed by William A. Burt, approached the vicinity of Teal Lake near what is now the town of Negaunee, on September 19, 1844. Surveying activities were disrupted

when the compass needle swung erratically and investigation revealed the presence of iron ore. Members of the survey party carried out samples of the ore, but little attention was paid to their finds as interest then was in copper. In 1845 Philo Everett of Jackson, Mich., formed a party and headed north with urge to make a fortune to seek copper and silver. At Sault Ste. Marie, they met a half breed Indian, Louis Nolan, who told them about Burt's experience. With the help of a Chippewa Chief, Margi Gesik, they located the outcrop of ore near Negaunee that later became the Jackson mine.

In 1846, Abraham Berry, first president of the Jackson Mining Co., explored the location and mined some iron ore. Returning from the 12-day trip with samples of iron ore, Berry met Dr. J. Lang Cassels who had come from Cleveland to search for copper or silver. When Berry learned that Dr. Cassels represented substantial interests, he disclosed the Cleveland location adjoining the Jackson property, on the condition that the expenses of keeping possession should be borne jointly. The site was visited and secured in the name of the Dead River Silver and Copper Mining Co., of Cleveland.

An agreement was made in April 1847 to purchase the land when offered for sale by the government. The original name was dropped and some of the original members lost interest, but their places were readily filled by a number of prominent men including Dr. Morgan L. Hewitt, Samuel

L. Mather and John Outhwaite. Negotiating informally, they called themselves the Cleveland Iron Co.

In the spring of 1850 the first step toward actual mining was taken, when on April 2 the Michigan legislature authorized the incorporation of the Cleveland Iron Mining Co. with a capital of \$500,000.

Dr. Morgan Hewitt became first president of the new organization. Samuel Mather, trained in law, and mainly occupied with his family's interests in the Connecticut Land Co. and other properties, became secretary-treasurer of the newly organized company. John Outhwaite, a young chemist, was elected vice-president. He became the operating man of the company and for a number of years was its general agent.

When Outhwaite visited the "Cleveland" location near Negaunee, Mich., he found squatters who refused to vacate. In the following summer, the company sent Charles Johnson to build a house to hold the claim. During his temporary absence the house was burned and the squatters continued to give trouble until the time of the government sale when the claim was established without difficulty. About this time the Marquette Iron Co. was formed by Richard Graverat, but the company lacked capital and sold out in 1852 to the Cleveland Iron Mining Co.

### Transport Problems Complicated Early Work

Communication and transportation were extremely difficult. Nothing but a narrow Indian trail led from the lake shore to the mines. When this was converted to an ungraded road, it was torn up under the weight of the small loads of iron ore. Freight had to be lightered ashore in small boats. Finally a dock was built, but it was so narrow that a wheelbarrow crowded it to capacity. These features and the extreme isolation of the operation made it exceedingly difficult to keep men at work at the mines.

Some early iron producers built furnaces near the mines and, although

Today the Cleveland-Cliffs Iron Co., celebrating its hundredth anniversary, is a major segment of the warp and woof of the domestic iron ore industry. Nearly every major steel producer in the United States has a vital interest, in some manner, in the activities of this company and many of them depend to a great extent upon it for their supply of iron ore. Here is the story of how this company grew from a small beginning to occupy a leading place in the production of iron ore from underground mines.

the Cleveland iron later became a local producer of charcoal pig iron, the management felt from the beginning that the real market for iron ore was at the lower lakes. But water transportation was a problem. Sail boats were commonly used for transporting the early product of the mine, although a few steamboats, known as "propellers," were also used. Loading the vessels usually required several days and at St. Mary's Falls the cargoes of 100 to 400 tons had to be unloaded, hauled overland, and reloaded in other vessels. In 1855 this difficulty was eased when the first Sault Ste. Marie Canal was opened. The Cleveland company acquired its first vessel in 1867, with a half interest in the barque *George Sherman*. More vessels were acquired as the company recognized the economy of transporting its own iron ore.

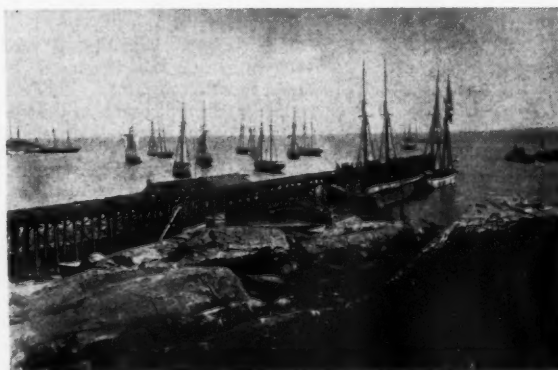
In a joint activity, the Jackson and Cleveland companies built a plank road from the mines to the lake shore at Marquette. Before completion the road was changed to accommodate wooden strap rails and served until 1857 when the Iron Mountain Railroad was built. In 1895 the Cleveland-Cliffs Iron Co., which had acquired all of the stock of the Cleveland Iron Mining Co. and of the Iron Cliffs Co., together with Lake Angeline Iron Co., completed construction of a new railroad known as the Lake Superior and Ishpeming Railway. In 1923 this was merged with several other lines and resulted in the establishment of the present modern Lake Superior and Ishpeming Railroad Co.

The first iron ore dock at Marquette was built by the Cleveland company in 1859, and the schooner *Sargent* was the first vessel to be loaded from this narrow, 400-ft dock.

### Production Facilities Improved

Originally, the iron ore mines in Michigan's upper peninsula were open pit producers. As overburden was stripped and the ores were mined, the surface was marked with many pockets which were gradually connected. It was not until 1866 that the Cleveland company sank its main hoisting shaft at the northeast corner of the workings. A stationary engine was shipped from Cleveland and underground work began. In 1887 diamond drills were first used to extend ore reserves. Compressed air was piped underground and, in 1910, electrification of the underground mines began.

From the first production in 1854, output gradually increased until by 1868, annual shipments had grown to 100,000 tons. With the acquisition of the property of the Jackson Iron Mining Co. in 1905, and, of other reserves acquired in 1891, production was rapidly increased. In May 1891, the Cleveland-Cliffs Iron Co. was incorporated with a capital stock of \$5,000,000 as the successor of the Cleveland Iron Mining Co. In 1949 the organization operated nine properties on the Marquette Range which produced 3,675,240 tons, and seven properties on the Mesaba Range which produced 3,459,288 tons.



The first iron ore dock at Marquette, Mich., as it appeared in 1859 contrasts sharply with the efficient structure used today

## Operating Mines

On the Marquette Range in Michigan, Cleveland-Cliffs operates the Athens Mine, which is owned jointly by the company and the Dalton Ore Co. Also, it has developed, and is operating for the Negaunee Mine Co., the Mather Mine which in 1949 produced 1,062,164 tons. The Negaunee Mine Co. is owned jointly by Bethlehem Steel Corp. and the company.

Prior to and during World War I, the company operated the Wade-Helmer and Crosby Mines in Minnesota and since 1920 it has had an interest in and has operated the Hill-Trumbull and Holman-Cliffs Mines of the Mesaba-Cliffs Iron Mining Co. In 1946-47 the company took over the Canisteo Mine and the three properties of the International Harvester Co., the Hawkins, Agnew and Sargent Mines. At its Minnesota properties it produces direct shipping ore and operates washing and treatment plants for ore requiring beneficiation.

In the early years in Michigan the company operated charcoal pig iron furnaces supplied with fuel from its extensive timber lands. A land and lumbering department was established in 1896. At the present time the company owns approximately 400,000 acres of timber lands which are operated under a program of sustained yield.

A hydro-electric power program was begun in 1910, culminating in the harnessing of the Au Train, Carp and Dead rivers, with a combined output of 25,520 kw; in 1949 two generating units consisting of five diesel engines in each unit, with a total capacity of 7500 kw was completed. The hydro-electric plant was transferred in 1926 to a wholly-owned subsidiary known as the Cliffs Power and Light Co. The Cleveland Iron Mining Co. built the first steam driven steel vessels for the Great Lakes ore trade, and at the present time Cleveland-Cliffs operates a fleet of 22 bulk cargo vessels, the largest with a carrying capacity of 16,000 tons.

A coal department was organized in 1919 to handle coal from the company's own mines as well as coal from other sources, and in 1948 more than 5,000,000 tons were handled. In 1922, the company acquired a modern coal dock at Green Bay, Wis., and also the controlling interest in a dock and equipment at Escanaba, Mich. Through wholly-owned subsidiaries a dock at Duluth and a vessel fueling dock at Port Huron, Mich., also came under company control.

## Outstanding Leaders Guided Growth

Samuel L. Mather was president of the Cleveland-Cliffs Iron Co. from 1866 until his death in 1890. His son, Wil-

liam G. Mather succeeded him in 1890 and remained as president until 1933 when he became chairman of the board. In 1947 he became honorary chairman, which title, at the age of 92, he still holds. In September 1933, E. B. Greene became president after a long period as a director. During his first year as president, Mr. Greene called upon Alexander C. Brown, then president of the Industrial Brownhoist Corp., to act as executive assistant. In 1934 Mr. Brown became executive vice-president of the company.

A second corporation, the Cliffs Corp., was formed in 1929 as part of a plan to form a new independent steel company. This plan was not consummated and in July 1947 stockholders of the two organizations voted to merge with the Cleveland-Cliffs Iron Co. The executive officers of the company are now Edward B. Greene, chairman of the board; A. C. Brown, president; V. P. Geffine, vice-president; J. H. Kerr, secretary; H. S. Harrison, treasurer; D. R. Forrest, assistant to the president; R. M. Kimmel, assistant secretary; and J. P. Long, assistant treasurer.

With a century of progress behind it, Cleveland-Cliffs fortified with substantial reserves of both high grade and low grade ores, looks forward to continuing its important part in supplying the future iron ore needs of this growing nation.

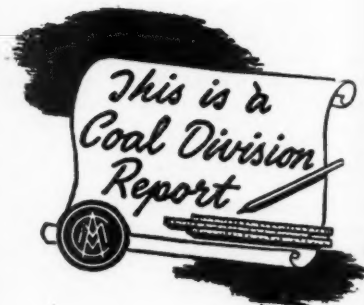


The Canisteo mine produces from the Mesabi range of Minnesota





Good track quickly installed is essential for mechanical loading



# Prefabricated Track Cuts Haulage Costs

By J. B. HASKELL  
and  
J. R. ULRICH

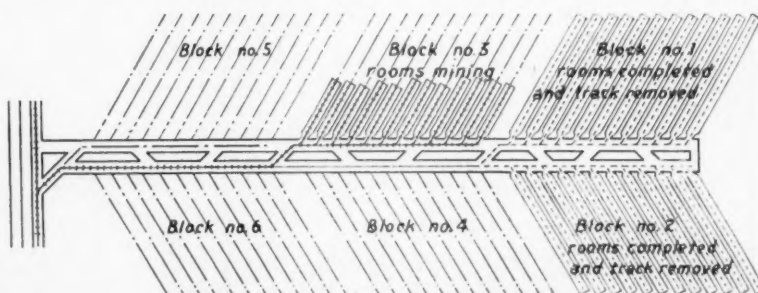
**How Economies Result From the Use of Manufactured Turn-outs and Pre-cut and Pre-curved Rails—A Report of the Haulageroads Committee**

TRACK haulage has been used in coal mining since the early beginnings of the industry and today it is still the standby method, dependable and economical. The haulage system is the main artery of a coal mine. However, in the transition from hand to mechanical methods, the other operations—loading, cutting and drilling—received major attention. Improvements in haulageroad construction came last on the list and only in recent years have new methods and equipment been given the attention they deserve. A number of progressive companies, both operating and manufacturing, realized the need for a track system that would meet the requirements of high speed and heavy equip-

ment. They led the way and railroad specifications for track construction are now being generally accepted by

the industry, particularly in those mines that have completely modernized their operations.

Main line and intermediate haulageroads can be considered as more or less permanent installations. But in the working panels, the track is temporary. In a room it may be only a month or two from the time that a switch is laid in the neck until the



Mine No. 1. Rooms without pillar recovery



place has been driven up, completed and the track taken out. In a panel of this nature considerable track work is needed and, using conventional methods, much labor is involved. In these days of rising wage scales, it has become essential to effect economies wherever possible. Prefabricated material has proved its worth in reducing track labor in a working panel.

Prefabricated track, or a track system made up largely of parts machined, bent and curved at the factory, can be used to construct a good mine track system adaptable to all needs. Such a system is designed to fit a particular mine layout and all rails, both curved and straight, turnouts and other track material are so made that they may be used throughout that mine interchangeably with no bending, cutting or curving. The turnouts, with special switch ties, etc., are designed to be quickly laid and as quickly removed.

Rails are furnished in standard lengths having a direct relationship to the cutter bar being used and the clean-up distance in a working place. Certain other rails are also furnished in related lengths, such as 8, 12 and 16 ft, so that changes in room neck locations may be made without departing from the interchangeability of the system when the mining conditions dictate such changes. The turnout length is also made with a direct relationship to rail length so that when a turnout is picked up, standard rails may be used to fill the gap. It has been found that inaccuracies in turning the rooms do not adversely affect the laying of prefabricated track as many of these errors are cancelled out. In other words, a room spacing is just as liable to be slightly over the required distance as slightly under.

Estimated costs of labor and material are shown for completely mining a panel as applied to two conventional mining systems—rooms without pillar recovery and rooms with pillar recovery. In the tables, the track systems are shown as Class I and Class II; Class I is where the material is purchased on the market in random lengths and Class II is where the rails are pre-cut to correct length and pre-bent to proper curvature before going underground. In this estimate, Class II shows a considerable saving over Class I. Comparisons, however, should not be made between the two mining systems. The total costs for labor and material charged to the panel is given in a lump sum, and the per ton cost in each case would of course depend on factors outside of the track work, such as width of working places, height of seam and percentage of coal recovered from the panel.

There are several reasons for the cost savings in Class II. To begin with, in using prefabricated track there is no wastage from cutting and

#### MINE NO. 1—ROOMS WITHOUT PILLAR RECOVERY

##### CLASS 1—TRACK WITH RANDOM STOCK MATERIAL

Using steel room ties—wooden ties in entry and turnouts; 18' 0" rails in both entry and room track, standard joints, all cutting and curving of rail done by track laying crew.

Material Used in Panel	Amount Material Used	Unit Material Cost	Purchase Cost of Material	Depreciation Rate—Uses	Material Charged to Panel	Labor to Install—Move
Room Track						
3900 ft @ 40 lb.....	54.9 N.T.	\$78.00	\$4,280.64	13%—7.6	\$557.00	\$3,760.00
Steel ties.....	1,570	1.72	2,700.00	23%—4.3	621.00	
Joints and bolts.....	433	1.16	500.12	26%—3.8	130.00	
Entry Track						
144 ft curved }	8.18 N.T.	78.00	638.00	13%—7.6	83.00	6,192.00
445 ft straight }						
Steel ties.....						
Wood ties.....	115	1.72	197.80	23%—4.3	46.00	
Joints and bolts.....	1244	.70	870.80	53%—3.0	290.00	
Turnouts—No. 2½.....	57	1.16	65.84	26%—3.8	17.00	1,320.00
	26	115.00	2,990.00	8%—12.5	239.00	
Total.....			\$12,243.64		\$1,983.00	\$11,272.00

Total Labor and Material Charged to Panel, \$13,255.00

##### CLASS 2—TRACK WITH RAILS PRECUT AND PRECURVED

Using steel ties in rooms and entry—steel switch ties with interlaced standard ties, standard turnouts knocked down with closure rail cut and curved. Stock rail precut and all straight rails cut to predetermined lengths.

Material Used in Panel	Amount Material Used	Unit Material Cost	Purchase Cost of Material	Depreciation Rate—Uses	Material Charged to Panel	Labor to Install—Move
Room Track						
3900 ft @ 40 lb.....	54.9 N.T.	\$78.00	\$4,280.64	13%—7.6	\$557.00	\$3,760.00
Steel ties.....	1,570	1.72	2,700.00	23%—4.3	621.00	
Joints and bolts.....	433	1.16	500.12	26%—3.8	130.00	
Entry Track						
261 ft curved }	1.359	1.72	1,229.70	13%—7.6	163.00	4,632.00
562 ft straight }						
Steel ties.....						
Joints and bolts.....	261	1.16	237.48	23%—4.3	544.00	
Extra bolts.....	261	1.16	301.45	26%—3.8	79.00	
Turnouts—Steel Ties.....	26	132.00	3,432.00	100%—1.0	25.00	1,086.00
				7%—14.3	245.00	
Total.....			\$14,806.79		\$2,364.00	\$9,478.00

Total Labor and Material Charged to Panel, \$11,842.00

Submitted by J. R. Ulrich.

#### MINE NO. 2—ROOMS WITH PILLAR RECOVERY

##### CLASS 1—TRACK WITH RANDOM STOCK MATERIAL

Using steel room ties; wood ties on the switches and turnouts; random length stock rails for straight and curved track and closure rails; standard purchased joints; all bonding, cutting and curving of rail done by tracklaying crew.

Material Used in Panel	Amount Material Used	Unit Material Cost	Purchase Cost of Material	Depreciation Rate—Uses	Material Charged To Panel	Labor to Install—Remove. Labor estimated at \$1.50 per hr
Straight Track:						
6004 ft @ 40 lb.....	80 N.T.	\$71.00	\$5,680.00	5%—20	\$284.00	\$2,332.50
Joints and bolts.....	600 pr	.855	513.00	12%—8	61.56	
Steel ties—No. 4.....	2000	1.35	2,700.00	10%—10	270.00	
Curved Track:						
1594 ft @ 40 lb.....	21.3 N.T.	71.00	1,512.30	5%—20	75.60	813.00
Joints and bolts.....	160 pr	.855	136.80	12%—8	16.32	
Steel ties—No. 4.....	530	1.35	715.50	10%—10	71.55	
Turnouts—No. 2½.....	42	82.00	3,444.00	5%—20	172.20	3,967.50*
Total.....			\$14,701.60		\$961.23	\$7,113.00

Total Labor and Material Charged to Panel, \$8,064.23.

##### CLASS 2—TRACK WITH RAILS PRECUT AND PRECURVED

Using steel ties, steel switch ties with standard steel ties interlaced; standard purchased turnouts knocked down, but with closure rails cut and curved; stock rails precut and all straight rails cut to predetermined lengths.

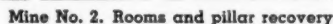
Material Used in Panel	Amount Material Used	Unit Material Cost	Purchase Cost of Material	Depreciation Rate—Uses	Material Charged To Panel	Labor to Install—Remove. Labor estimated at \$1.50 per hr
Straight Track:						
6004 ft @ 40 lb.....	80 N.T.	\$71.00	\$5,680.00	5%—20	\$284.00	\$2,332.50
Joints and bolts.....	600 pr	.855	513.00	12%—8	61.56	
Steel ties—No. 4.....	2000	1.35	2,700.00	10%—10	270.00	
Curved Track:						
1594 ft @ 40 lb.....	21.3 N.T.	**	1,894.86	5%—20	94.70	609.40
Joints and bolts.....	160 pr	.855	136.80	12%—8	16.32	
Steel ties—No. 4.....	530	1.35	715.50	10%—10	71.55	
Turnouts—No. 2½.....	42	98.00	4,116.00	5%—20	205.80	3,331.70
Total.....			\$15,756.16		\$1,003.93	\$6,273.60

Total Labor and Material Charged to Panel, \$7,277.53.

\* Lay and remove 92 turnouts at 27 hours each.

\*\* \$71 per net ton plus 24¢ per lineal ft of track.

Submitted by J. B. Haskell.



material it is generally found that the rail may be laid in about one-third the time it formerly took under the old methods and this labor does not require experienced crews. Further labor is saved by the elimination of cutting, bending and drilling rails.

Finally, through true gauge of track and proper alignment of turnouts and curves, there is less track maintenance as well as less wear and tear on mine cars and locomotives.

## Permanent Track

The foregoing deals principally with prefabricated track as applied to the working section of a mine. It is also well established that track for permanent locations may be prefabricated, and made ready to install, with a resultant saving in time and labor to the coal company. This especially may be the case where a complicated track arrangement is required, as for example where crossings, double cross-overs, etc., are involved. The principal idea and purpose of prefabricated material is to save time and labor in the installation and removal of track in the mines, and at the same time permit better haulage and operating conditions with their resultant cost savings.

## A PREFABRICATED TRACK OPERATION

By J. N. CRICHTON

Experience has taught a great deal about how such track should be installed. First, the haulage layout must be coordinated with the mining system and the advance plan must consider all track details such as rail lengths, location of curves, switches and turnouts. Blueprints must show by identifying numbers where each straight rail, curved rail, frog, switch, etc., is to be located. The surveyors and trackmen must be thoroughly familiar with these details so that proper sight lines can be set and the layout plans followed. Then there must be periodic checks by surveys and measurements to see that no errors have

Track haulage is employed throughout—from the tippie to the working faces where the coal is loaded mechanically directly into mine cars. In this system the time for the car change at the working face is the main factor that determines cost and production. Since it takes as much time to shift a one-ton car as an eight-ton car, as large a capacity car as can be handled is used. This reduces operat-

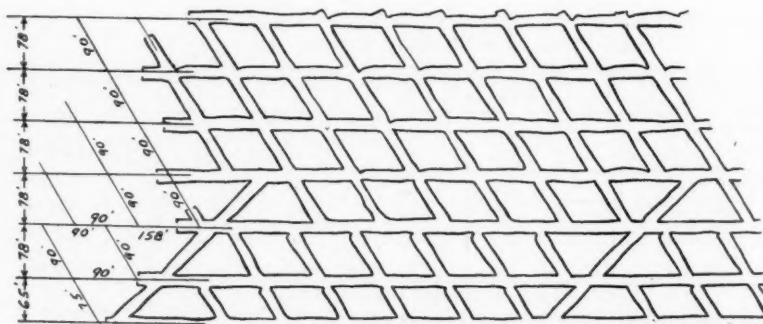


### Prefabricated turnout reduces track labor

accumulated. The foregoing may sound involved but it is comparatively simple in actual practice.

The track laying does not necessarily require highly skilled labor, as the blueprints are easily understood. Also, the work goes much faster with a consequent saving in labor cost. For example, two men can lay a room switch with steel ties in approximately two hours. After the track crews have learned the mining plan and have become accustomed to using the prefabricated material, there is no need for the detailed supervision required in conventional track work where all rails are cut, bent and fitted underground.

The supervisor or his assistant lays out the work, of course, but does not have to stay with the crew continually as the men can usually make the installation without constant bossing. The prefabricated material costs somewhat more than stock material but the additional expense is more than offset by the resulting economy in labor.



Plan of a typical panel using prefabricated track with mechanical loading into mine cars

# Outstanding Convention And Exposition Scheduled For Salt Lake Meeting

**Problems of Current Interest to All Branches of Metal  
and Nonmetallic Mining Industry to Be Analyzed**

MINING will get its annual check-up at the 1950 Metal Mining Convention and Exposition at Salt Lake City when the men who are responsible for all phases of the business and operating ends of the industry meet at the State Fair Grounds, August 28-31.

Early estimates indicate that this half-century, mile-post meeting will mark up a record attendance to hear mining leaders, top industrialists and government officials analyze present conditions and explain the outlook for the future. At this informal, "shirt sleeve" clinic everyone will have the opportunity to contribute his views and discuss his problems with fellow mining men.

A nation-wide Program Committee of key men of the industry has performed a splendid task in selecting, from hundreds of suggestions, those topics which are of major interest for discussion at Salt Lake City.

Full attention will be given to gen-

eral policies affecting mineral production and development, including public lands, stockpiling, tariffs, taxation, the foreign aid program, labor relations, safety, problems of the small mine operator, exploration and development, atomic energy, public relations and many others.

Another series of comprehensive sessions will be devoted to important operating and production problems, accenting greater efficiency and economy in mining and ore treatment. Full information on each topic will be brought forth by authoritative speakers, specialists in their respective fields and open discussion will be encouraged.

More than 110 of the nation's leading manufacturers and suppliers have cooperated in an all-out effort to make the 1950 Exposition the greatest display of metal mining machinery, equipment and supplies that has ever been assembled. There, engineering and operating personnel have a unique

opportunity to glean ideas to combat high production costs through increased mechanization and the modernization of mine and mill operations. Production and maintenance personnel will find this an especially favorable time to talk to exhibitors' technical representatives and to discuss the application of specific products to their own problems.

Throughout the show you will find new and thought-provoking ideas aimed at cost-saving, increased efficiency and safety. The comprehensive displays will feature all types of drill bits, drill steel, rock drills, jumbos, hose, sharpening equipment . . . explosives and blasting accessories . . . mine car loaders, shaker conveyors and underground belt conveyors . . . mine cars and track work, locomotives, shuttle cars . . . slusher hoists and scrapers, mine hoists . . . air compressors, mine fans and ventilating equipment . . . electrical cables and mining ropes . . . Diesel engines, power transmission units, drive belts . . . storage batteries . . . electrical equipment and switch gear . . . crushers, feeders, fine grinders, screens, concentrators, flotation units and flotation reagents . . . mill units and electronic controls . . . lubricants . . . shovels, dragline excavators . . . safety equipment, and all of the wide variety of specialized tools and equipment that are vital to mining progress. For four full days this outstanding Exposition will be open for inspection of the displays and for discussion with manufacturers' representatives.

On September 1, the Minerals Beneficiation Division of the AIME will hold its Regional Meeting at the Hotel Utah. The technical program of this group, together with the milling sessions of the Mining Congress Convention and Exposition, will give mill men a full measure of information on progress in this field.

Sparkling entertainment promises Convention visitors a rollicking good time in addition to the serious side of this important meeting. An informal welcoming luncheon in the Coliseum at the State Fair Grounds will highlight the opening day of the Convention, when a leading national figure will present a timely address of real interest.

Monday evening will feature the celebrated "Galena Days" event. Spe-



World famous landmarks of Salt Lake City—hub of western mining



# --- --- Preliminary Program --- ---

## Monday, August 28

### MORNING—FIRST GENERAL SESSION

The Business Outlook  
Prospects for the Nonferrous Metals and for Silver  
Trend of Metal Production, Wages and Prices  
Problems of the Small Mine Operators

### NOON—WELCOMING LUNCHEON

### AFTERNOON—SECOND GENERAL SESSION

The Foreign Aid Program and Its Relation to the Mining Industry  
Sound Currency for a Sound Economy  
The Future of Gold

### AFTERNOON—FIRST OPERATING SESSION

"Packaged" Timber Handling  
Incentive System Increases Tons Mined Per Man-Shift  
Hydraulic Hoisting—A Unique Method of Moving Crushed Ore

## Tuesday, August 29

### MORNING—THIRD GENERAL SESSION

Domestic Supplies of Strategic Minerals  
Progress in Stockpiling for National Security  
Mining Role in National Preparedness  
Tariff Needs of the Mining Industry

### MORNING—SECOND OPERATING SESSION

Operating Factors in Heavy-Media Separation  
Rod Mill Liners—Panel Discussion  
Application and Performance of New Holland Breakers  
Golden Cycle's Modern Mill

### AFTERNOON—FOURTH GENERAL SESSION

Safety Progress in Metal Mining  
Labor Relations Today—A Symposium  
The Future of Our Labor Law

### AFTERNOON—THIRD OPERATING SESSION

White Pine—A Potential Major Copper Producer  
Progress Towards Production at the Blackbird Cobalt Mine  
Geochemical Prospecting—A Symposium  
How Aerial Photography and the Airborne Magnetometer Have Aided Extension of Ore Reserves

## Wednesday, August 30

### MORNING—FIFTH GENERAL SESSION

Current Proposals for Mining Law Changes—Government and Industry Views  
The Phosphate Industry—What It Means to the West

### MORNING—FOURTH OPERATING SESSION

Roof Bolting in Metal Mining  
Truck Haulage Power Plants  
Trackless Mechanized Mining in the Lead Belt  
Sand Filling Improves Stopping Efficiency

### AFTERNOON—SIXTH GENERAL SESSION

Atomic Energy for Peacetime Power  
Uranium Procurement Policies and Plans  
Economics of Domestic Uranium Production  
Prospecting for Carnotite Deposits  
Processing of Uranium Ores

### AFTERNOON—FIFTH OPERATING SESSION

Problems of Underground Rock Breaking  
Rock Drill Developments  
How to Get More Footage Out of Hollow Drill Steel  
An Over-All Look at Rock Drill Bits  
Progress in Blasting Procedures

## Thursday, August 31

### MORNING—SEVENTH GENERAL SESSION

The 1950 Revenue Bill—Present-Day Tax Policy and the Mining Industry  
Public Relations and Public Opinion  
Public Relations—Importance of the Stockholder

### MORNING—SIXTH OPERATING SESSION

The Fluo Solids Process  
Plans for Treating Greater Butte Project Ores  
Tailings Disposal Problems  
Grinding With Centrifuged Media

### AFTERNOON

Group Conferences on Taxation, Gold, Strategic Minerals, Public Lands, etc.

NOTE—The Fall Meeting of the Minerals Beneficiation Division, AIME, will be held on Friday, September 1, at Hotel Utah.



Scenic Big Cottonwood Canyon



Wasatch Mountains dwarf Geneva steel plant



cial transportation will take convention-goers to Bingham Canyon for an evening of gay excitement. Following refreshments and a good hot supper on the 6190 level of the famous Utah Copper open pit, there will be entertainment, dancing and full enjoyment of this interesting and unique revival of Bingham's wide open days. Old-west getups, including whiskers and costumes of 50 years ago will be the order of the evening. This will be a frolic-full evening that no one will want to miss.

Tuesday night has been left open for private parties as an occasion to meet old friends and make new ones.

The Mining Jamboree, famed for fine entertainment and the traditional fellowship and fun of the Mining Congress Convention crowd, will be held at Lagoon on Wednesday night. After some liquid refreshments and a juicy steak supper, the entertainment features of this fine park will be wide open for convention-goers. There will be dancing to a top band, swimming in one of the West's finest pools and many other attractions.

Top function of the mining year, the Annual Banquet of the Western Division of the American Mining Congress, will be held on Thursday evening. It will be a "speechless" event with the toastmaster introducing honored guests in brief, snappy fashion. Then the program will be turned over for the entertainment of mining men and their ladies. Top radio and stage artists will be featured and dancing to an outstanding orchestra will continue until the early hours.

Ladies are welcome at all Convention functions and their presence will contribute greatly to the enjoyment of these events. In addition, a special program is being planned for the visiting ladies. On Tuesday afternoon they will be the guests of Mrs. C. C. Parsons at a tea and reception at her home. Wednesday morning, following a delightful "brunch" on the Hotel Utah roof, a complimentary special organ recital will be held at the L.D.S. Tabernacle, widely known for its fine acoustics. The ladies will tour various points of interest in Salt Lake City on Thursday and proceed to Mill Creek Canyon for a picnic lunch. The route will include a visit to Memorial Grove and "This is the Place" monument.

On top of the unexcelled events of the 1950 Metal Mining Convention and Exposition, a visit to Salt Lake City affords an excellent opportunity to enjoy the attractions of the city and its scenic surroundings.

On Friday, September 1, a special airline trip will take the flying miners over Bingham, Tooele, Tintic-Eureka, Cottonwood, Alta, Park City and back to Salt Lake City. Maps of the various districts, showing general geologic and structural features will be furnished and a geologist will accom-

(Continued on page 50)

## List of Exhibitors

Allis-Chalmers Mfg. Co.	Edison, Inc., Thomas A. Storage Battery Division	National Electric Coil Co.
Allis-Chalmers Mfg. Co. Tractor Division	Elmco Corp.	National Malleable & Steel Castings Co.
Alloy Steel & Metals Co.	Electric Storage Battery Co.	National Tube Co.
American Air Filter Co., Inc.	Elreco Corp.	Nordberg Mfg. Co.
American Brattice Cloth Corp.	Engineering & Mining Journal	Ohio Brass Co.
American Bridge Co.	Euclid Road Machinery Co.	Osgood Co.
American Institute of Mining & Metallurgical Engineers	Flexible Steel Lacing Co.	Osmose Wood Preserving Co. of America, Inc.
American Manganese Steel Division	Galigher Co.	Ottumwa Iron Works
American Brake Shoe Co.	Gardner-Denver Co.	Pittsburgh Gear Co.
American Steel & Wire Co.	Gates Rubber Co.	Raybestos-Manhattan, Inc.
American Wheelabrator & Equipment Corp.	General Electric Co.	Manhattan Rubber Division
Anaconda Wire & Cable Co.	Goodman Mfg. Co.	Rock Bit Sales & Service Co.
Anderson Mfg. Co., Albert & I. M.	Gould Storage Battery Corp.	Roebbling's Sons Co., John A.
Armco Drainage & Metal Products, Inc.	Hardinge Co., Inc.	Sandvik Steel, Inc.
Atlas Powder Co.	Harnischfeger Corp.	Sheffield Steel Corp.
Barber-Greene Co.	Hercules Motors Corp.	Simplicity Engineering Co.
Bethlehem Pacific Coast Steel Corp.	Hercules Powder Co.	Socony-Vacuum Oil Co., Inc.
Bucyrus-Erie Co.	Hewitt-Robins, Incorporated	Southwestern Engineering Co.
Buda Co.	Robins Conveyors Division	Stearns-Rogers Mfg. Co.
Buell Engineering Co.	Humphreys Investment Co.	Talcott, Inc., W. O. & M. W.
Bullard Co., E. D.	Engineering Division	Tamping Bag Co.
Calumet & Hecla Consolidated Copper Co.	Independent Pneumatic Tool Co.	Tennessee Coal, Iron & Railroad Co.
Card Iron Works Co., C. S.	Ingersoll-Rand Co.	Timken Roller Bearing Co.
Carnegie-Illinois Steel Corp.	International Harvester Co.	Tool Steel Gear & Pinion Co.
Caterpillar Tractor Co.	Jeffrey Mfg. Co.	Trabon Engineering Corp.
Chicago Pneumatic Tool Co.	Jones & Laughlin Steel Corp.	Tyler Co., W. S.
Christensen Diamond Products Co.	Joy Mfg. Co.	Ultra-Violet Products, Inc.
Colorado Fuel & Iron Corp.	Kennametal Inc.	United States Steel Corp.
Colorado Iron Works Co.	Le Roi Co.	United States Steel Export Co.
Columbia Steel Co.	Cleveland Rock Drill Division	United States Steel Supply Co.
Crucible Steel Company of America	Leschen & Sons Rope Co., A.	Universal Atlas Cement Co.
Cummins Engine Co., Inc.	Lima Shovel & Crane Division	Victaulic Company of America
Cyclone Fence Division	Lima-Hamilton Corp.	Western Cartridge Co.
American Steel & Wire Co.	Linde Air Products Co.	Division of Olin Industries, Inc.
Dart Truck Co.	Link-Belt Co.	Western Machinery Co.
Denver Equipment Co.	Link-Belt Speeder Corp.	Western Rock Bit Mfg. Co.
Detroit-Diesel Engine Division	Ludlow-Saylor Wire Co.	Westinghouse Electric Corp.
General Motors Corp.	Mack Mfg. Corp.	Willson Products, Inc.
Du Pont de Nemours & Co., Inc., E. I.	Marion Power Shovel Co.	Worthington Pump & Machinery Corp.
	Mine Safety Appliances Co.	
	Mine & Smelter Supply Co.	
	Mining Congress Journal	
	Mining World	
	Morris Machine Works	
	Morse Bros. Machinery Co.	
	Mosebach Electric & Supply Co.	

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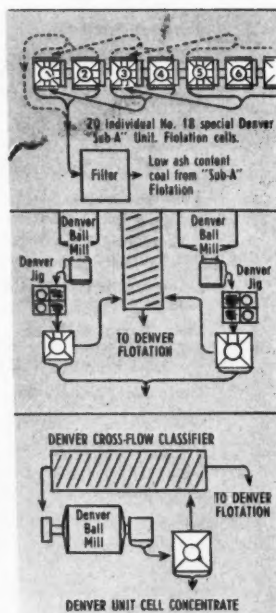


# DENVER "SUB-A" UNIT FLOTATION CELL

**Roddymoor\*  
Coal Flotation  
England**

**Coarse Gold  
From Grinding  
Circuit**

**Slime Loss Reduced  
in Copper Plant**

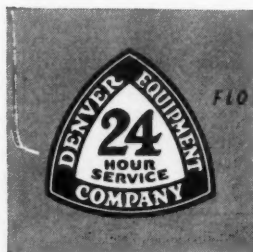


Extreme flexibility is provided by using Denver "Sub-A" Unit Flotation Cells. Mr. H. Nelson of England's National Coal Board, says, "... Denver Flotation Cells have proved ideal for our purpose; being flexible enough to allow almost any combination of flows, and extremely low in maintenance costs."

Free gold and gold associated with chalcopryrite, are much easier to float in a dense pulp, easily maintained in a Denver Unit Flotation Cell. Such high densities in subsequent flotation circuits cannot be satisfactorily handled, thus making even more desirable the recovery of coarse values in the grinding circuit.

Decreasing slime loss in copper circuit is the function of this Denver "Sub-A" Unit Cell. Recovery of copper at a coarse size eliminates overgrinding and resulting slime losses. Combined concentrate of Unit Cell and subsequent "Sub-A" Flotation gives higher average grade as well as higher total recovery.

\*Read this complete story in May-June, 1950, *Deco Trefoil*.



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# Wheels of GOVERNMENT



As Viewed by A. W. DICKINSON of the American Mining Congress

DESPITE the disturbed situation in the Far East, Congressional leaders are driving on with eyes set on an adjournment, or a recess subject to recall, by the end of this month. The House calendar is clear of major legislation, except for action on conference reports, and the Senate has only the omnibus appropriation bill and tax revision, plus some degree of tilting over FEPC legislation. The tax bill is expected on the Senate floor July 20, which the leaders consider soon enough to permit the Congress to close up shop by August 1.

## Taxation

The Revenue Bill of 1950, passed by the House June 29, is now in process of hearings before the Senate Committee on Finance. Hearings began July 5 with Treasury Secretary Snyder presenting the Administration viewpoint. The American Mining Congress gave the Committee the position of the mining industry on July 12.

The bill approved by the House cuts excise taxes \$1.01 billion, including a reduction in the freight excise tax from 3 to 1½ percent; that on coal from 4 to 2¢ a ton.

Corporate income is subject to a flat 21 percent normal tax, up to \$25,000 and a flat 20 percent surtax applies above that figure. The bill contains the "speed-up" plan under which, during the next five years, corporations would pay a progressively increased proportion of their taxes in the first two quarters until 1955 when the entire tax would be payable in the first half of the year.

Also provided is a withholding tax of 10 percent on dividends paid to corporate stockholders; a reduction in the interest rate on tax refunds from 6 to 3 percent, while retaining the 6 percent on tax deficiencies; a one-year carry-back and five-year carry-forward of net operating losses; a limitation of the dividends-received credit for property distributed in kind to 85 percent of the basis of the property in the hands of the distributing corporation; making dividends from earnings

and profits of corporations accumulated prior to March 1, 1913, or from appreciated values as of that date, subject to tax; reducing the holding period for long-term capital gains and losses from 6 to 3 months, and treating gain or loss from the sale or exchange of property used in the trade or business as capital gain or capital loss; making income derived by shareholders in so-called "collapsible corporations" taxable as ordinary income rather than as capital gain; tightening of estate taxes, taxes on life insurance companies, and making the income over \$1,000 from unrelated business activities of certain tax exempt organizations subject to tax.

The 15 percent percentage depletion allowance is extended to Fuller's earth, refractory clays, quartzite, fire clay, perlite, diatomaceous earth, tripoli; and a 5 percent percentage depletion allowance is made to stone, brick and tile clay, shale, oyster and clamshell deposits, sand, gravel, marble and granite. The percentage depletion allowance for coal is increased from 5 to 10 percent. No change was made in percentage depletion for oil, gas, sulphur and metal mines.

One definitely harmful feature to mining enterprises would amplify the definition of "gross income from the property" to provide "but such term shall in no case include transportation beyond the property." For several years the Treasury has been seeking to deny the inclusion in gross income of the cost of transportation from mine to mill or preparation plant. This amendment will be energetically resisted by the American Mining Congress.

At the Finance Committee hearings, Treasury Secretary Snyder reiterated his opposition to percentage depletion allowances, and urged "the changes which were proposed to the Ways and Means Committee which would carry out the recommendations of the President that the more excessive special depletion allowances permitted under law be reduced."

Determined opposition by the Min-

★ ★ ★ ★ ★ ★ ★

## Washington Highlights

**CONGRESS:** Now on home stretch.

**TAX:** Bill due on Senate floor July 20.

**SOCIAL SECURITY:** In conference.

**RECIPROCAL TRADE:** Mexican agreement terminated.

**INCENTIVE PAYMENTS:** 21-day rule may bring vote.

**ASSESSMENT WORK:** Time extended to October 1.

**FREIGHT ABSORPTION:** O'Mahoney bill vetoed.

★ ★ ★ ★ ★ ★ ★

ing Congress and representatives of other industries is being made to a feature of the House bill which would greatly curtail and might effectively deny to taxpayers losses sustained through sale or abandonment of capital assets or of property used in the trade or business. The bill provides that abandonment of such assets shall be considered as a sale or exchange of property; hence any losses incurred on abandonment would not be deductible as ordinary loss, but could be deducted only from capital gains, either those realized during the same taxable year or in succeeding years to which such a loss might be carried forward. In the main, this would deny any deduction since only in exceptional cases will mining taxpayers have capital gains against which to offset such abandonment losses.

## Social Security

Now in conference, the Social Security bill, H. R. 6000, passed the Senate June 20 in the form reported by the Finance Committee and discussed last month, with the addition of but two amendments. One of these raised the tax base from the first \$3,000 of individual earnings to the first \$3,600 and increased the maximum primary



insurance benefit from \$45, as in the present law, to \$80. The second amendment, introduced by Senator Knowland of California, restricts the power of the Secretary of Labor to withhold unemployment compensation payments from a state until judicial review has established whether any state action which has been questioned by the Administrator does or does not conform to Federal law.

The bill continues the common law definition of the term "employee," thus excluding independent contractors and mine "leasers" from coverage.

In the course of the floor debate Senator Malone (Rep., Nev.) inquired of Senator Millikin if mining lessees might be considered "employees" under the provisions of the Senate bill. Senator Millikin replied: "I may say to the distinguished Senator from Nevada that we had probably as good a hearing coverage on that point as on any point which came before the Committee. I am thoroughly convinced that the type of mining lessee the Senator speaks of is not covered by the pending bill. He would have been covered by the bill which came to us from the House of Representatives."

### Trade Agreements

Abrogation of the Mexican foreign trade agreement of 1943, which will become effective December 31, 1950, offers some measure of encouragement to domestic metal and mineral producers. The duty on lead-bearing ores, flue dust and mattes will now be restored from  $\frac{3}{4}\text{¢}$  per pound to  $1\frac{1}{2}\text{¢}$ ; lead bullion, lead pigs and bars, lead dross, reclaimed lead, and scrap lead from  $1\frac{1}{16}\text{¢}$  per pound to  $2\frac{1}{4}\text{¢}$ .

Although zinc ores were cut from  $1.2\text{¢}$  per pound to  $0.75\text{¢}$ , and slab zinc from  $1.4\text{¢}$  to  $0.875\text{¢}$  per pound, there will be no restoration of duty because these cuts were bound against increase at the Geneva Trade Conference in 1948.

The duty on molybdenum ore and concentrates will revert from  $17\frac{1}{2}\text{¢}$  per pound of metallic molybdenum content to  $35\text{¢}$ ; fluorspar from  $\$6.30$  per ton to  $\$8.40$  per ton on ores containing not more than 97 percent  $\text{CaF}_2$ . Fluorspar containing more than 97 percent  $\text{CaF}_2$  was bound at  $\$4.20$  a ton, but this binding lapses with cancellation of the trade agreement. The import tax on crude petroleum, topped crude petroleum, and fuel oil reverts from  $10\frac{1}{2}\text{¢}$  a barrel to  $21\text{¢}$  a barrel and would apply to imports in excess of 5 percent of domestic output during the preceding calendar year.

Meanwhile, lead producers are filing a supplemental petition with the U. S. Tariff Commission asking that immediate action be taken to restore the lead duties under the "escape clause" provisions of the tariff law.

### Incentive Payments

On June 28 the House Rules Committee acted adversely on the mine incentive payments bill introduced by Representative Sabath (Dem., Ill.), carrying an appropriation authorization of  $\$165,000,000$  over a four-year period. The bill by Representative Clair Engle (Dem., Calif.), H. R. 8821, which carries an authorization for  $\$330,000,000$  is still held in the Rules Committee. House Public Lands Committee Chairman Peterson (Dem., Fla.) has introduced a resolution to discharge the Engle bill from the Rules Committee and bring it to a vote on the House floor under the 21-day rule. The discharge calendar will be called July 24 under present plans.

### Suspension of Assessment Work

On June 14 the President approved Representative Clair Engle's (Dem., Calif.) bill, H. R. 6406 (Public Law No. 544), which provides specific means for mining claimholders who performed assessment work during the year ending July 1, 1949 to receive credit for this assessment work during the current year.

On June 29 Senator Cordon's (Rep., Ore.) bill, S. 3639 (Public Law No. 582), received White House approval. The Cordon bill extends until October 1 the time in which to perform assessment work for the current year. This law applies to Alaska as well as to continental United States. It does not require the claimholder to give notice of his intention to take advantage of the extra time.

### Freight Absorption

On June 15 the President vetoed the O'Mahoney freight absorption bill, S. 1008, saying that recent court decisions and statements of the Federal Trade Commission have helped to clarify the situation and have been "effective in eliminating certain abuses of competition." The bill provided that producers, acting independently, may sell at identical delivered prices at different points of delivery or may absorb freight costs in good faith to meet competition.

Senator O'Mahoney declared that he interpreted the President's statements as "clear notice" to business men that they can individually absorb freight charges and sell at delivered prices. He said, "I take this to be an expression of the desire of the President of the United States that the FTC will not and should not bring any proceedings against any seller who by individual action, without combination or conspiracy, adopt either of these practices."

Senate Commerce Committee Chairman Ed Johnson (Dem., Colo.) has appointed a five-man "watchdog" sub-

committee to observe the activities of the FTC in cases involving freight absorption and delivered pricing. Personnel of the Committee includes Senators Johnson (Chairman); Myers (Dem., Pa.); O'Connor (Dem., Md.); Capehart (Rep. Ind.); and Bricker (Rep., Ohio).

Johnson stated that whether or not new legislation would be necessary in the next Congress will depend upon how the FTC responds to the expressed will of Congress, and the clear implication of the President in his veto message, of the need for an assurance to industry of its right to engage in competitive pricing practices and freight absorption.

### Metal Convention

(Continued from page 47)

pany each flight to describe points of interest.

Another trip on Friday, September 1, will be made to the Geneva Steel plant when the travelers will go by bus past the Murray and Midvale smelters to visit this giant  $\$200,000,000$  plant near Provo. A company guide will conduct the group on a  $2\frac{1}{2}$ -3 hour inspection trip of this great western steel development.

Buses will leave at 8 am Saturday, September 2, for a trip to the Garfield smelter, the Magna and Arthur mills and the new electrolytic refinery, on the way to visit the great open-pit operation of Kennecott's Utah copper mine at Bingham.

Arrangements have been made by the U. S. Bureau of Mines with the Denver & Rio Grande Western Railway for special pullman service for the convenience of those who wish to visit the interesting oil shale demonstration project at Rifle, Colo. A visit to this long range project will permit mining men to see at first hand the advanced methods and equipment by which some extraordinarily low costs in rock breaking have been attained. The special pullman cars, which will be available if a sufficient number of reservations are received, will leave Salt Lake City 5:30 pm Friday evening, September 1, arriving at Rifle Saturday morning and leaving Saturday night for Denver or for Salt Lake City.

All planning to participate in field trips are urged to make reservations immediately. Prompt action will avoid disappointment and the Trips Committee will be provided with advance information on which to base proper arrangements.

This main event of the mining year is open to all those who are interested in mining and its future welfare. Whether your main interest in mining is in the field of business policy or in the day-to-day task of "putting rock in the box," you can help yourself and the industry by taking an active part in the 1950 Metal Mining Convention and Exposition.





# Personals

R. T. Laing, for the past five years executive secretary of the Minerals Producers Association, Kittanning, Pa., has been appointed executive director of the Central Pennsylvania Coal Producers' Association and the Eastern Bituminous Coal Association.

J. William Wetter is president of the Central Pennsylvania Coal Producers' Association and the Eastern Bituminous Coal Association.

R. C. Cole, assistant manager of the Utah department, American Smelting & Refining Co., has been appointed assistant to the manager of the ore buying division in New York. C. R. Fish, assistant ore buyer for the Utah department, will succeed him as assistant manager and ore buyer. R. L. Jourdan, former assistant manager for the Utah department, is ore buyer for the company.

Thomas J. McParland, general superintendent of the West Virginia and Kentucky divisions of U. S. Coal & Coke Co., retired on May 31 after 52 years of service. William R. Stedman, formerly assistant general superintendent of the West Virginia and Kentucky divisions. Lloyd M. Lineberry, formerly superintendent, Mine No. 2, has been appointed assistant general superintendent of the West Virginia division, succeeding Mr. Stedman.

Max D. Howell, assistant to president, vice-president, secretary and treasurer of the U. S. Steel Corp. of Delaware, has been elected vice-president and treasurer of U. S. Steel Corp., N. J.

Eugene P. Reed has been promoted to the post of assistant to the general superintendent of ore mines and quarries for the Tennessee Coal, Iron and

Railroad Co. He has succeeded as superintendent at Muscoda ore mines by G. M. Neal, formerly assistant to the manager of industrial relations. Mr. Neal's place has been taken by Edward H. Stevens, formerly project engineer. Leland H. Johnson has been appointed assistant chief engineer for ore mines and quarries.

John F. Stock, Jr., of the United Verde Branch, Phelps Dodge Corp., Jerome, Ariz., was awarded a certificate of honor by the Joseph A. Holmes Safety Association of the U. S. Bureau of Mines. He received the citation for supervising an underground crew without a single lost-time accident from December 1941 to December 1949, a total of 325,824 man-hours.

Elmer R. Kaiser, assistant director of research, Bituminous Coal Research, has been elected chairman of the fuels division of the American Society of Mechanical Engineers.

Robert Annan, chairman, New Consolidated Gold Fields, Ltd., has been awarded the gold medal of the Institution of Mining and Metallurgy of London, England, the highest distinction that the council has the power to grant. The award was made in recognition of his distinguished services to the mining industry and the mining profession.

John W. Williamson is mine manager at the new No. 40 mine of the Peabody Coal Co. Construction superintendent is W. B. Reuter. Gordon Fuller is division electrical engineer and Carl Burgener is division mining engineer. A. L. Reid is chief electrician. Clyde Boyett is top foreman. Layton Aldridge second shift manager and Elmer Davis is chief clerk.

James A. Fraser, now completing work for the master of science degree at the University of British Columbia, has been awarded the E. J. Longyear Co. fellowship in metalliferous economic geology for 1950-51 at the Department of Geology, University of Minnesota.

Dr. A. A. Potter, dean of engineering, Purdue University, was recently elected president of Bituminous Coal Research on a part-time capacity. He

assumes the functions that have been the responsibility of R. H. Sherwood on an interim basis since the resignation of James B. Morrow on April 7. Mr. Sherwood will again be BCR's first vice-president.

Sam Goss has been named pit foreman at the Morton stripping job of the M. A. Hanna Co. Robert Van Evera has been promoted to pit foreman in the Cooley district. Solomon Friend is now pit foreman at the Weggum Mine. Warren Severson has been promoted to pit foreman at the Morton Mine. William Waite is now assistant shop foreman of the Harrison shops at Cooley.

Claude P. Heiner, former president, Utah Fuel Co., will serve as management consultant to Book Cliffs Coal Corp., a subsidiary of Kaiser Steel Co., that recently acquired the holdings of the Utah Fuel Co.

Dr. Robert J. Wright, geologist with the Atomic Energy Commission, is in Arizona to study the state's uranium ore discoveries. He will maintain headquarters with the U. S. Bureau of Mines, Tucson. For the past year Dr. Wright has been engaged in similar ore evaluation jobs for the AEC in various parts of the country.

E. W. Engelmann, assistant general manager, Utah Division, Kennecott Copper Corp., received the honorary degree of doctor of engineering in commencement exercises at the Missouri School of Mines. Since graduation from that school in 1911, Mr. Engelmann has been in the employ of Kennecott Copper Corp.

H. B. Brown, Jr., has been appointed to the public relations staff of Bituminous Coal Institute. He succeeds Howard J. Carswell, who resigned to join the Guaranty Trust Co. of New York.

Jasper Garland, Bernard Forss and Robert Anderson are now pit foremen at the South Agnew Mine of the M. A. Hanna Co. John Bemis was recently named pit foreman at the Weggum mine. Robert Kuntz has been promoted to truck inspector for all Hanna mines in Minnesota.

George C. Taylor, Jr., geologist, U. S. Geological Survey, has been detailed to New Delhi, India, on groundwater problems.



R. T. Laing



E. W. Engelmann

**Walter C. Russert**, an assistant general superintendent for the Anaconda Copper Mining Co. in Butte, Mont., has been elected as a member of the national nominating committee for the Massachusetts Institute of Technology, which selects candidates for the executive board of the Institute.

**R. C. Bierer** recently completed courses in mining given by the West Virginia University School of Mines extension class. With a grade of 96 he led the group. Mr. Bierer works for Pardee & Curtin Lumber Co.

**Fred D. Vines** has been appointed assistant chief engineer of The M. A. Hanna Co. with headquarters at the general offices in Cleveland. **R. S. Walker** is chief engineer.

**Herman E. Bakken** will become vice-president and general manager of Aluminum Ore Co., effective August 1, 1950.

**Robert Smith** of the Inland Steel Co. coal properties near Wheelwright, Ky., has been transferred from the safety department to the operating department as coal inspector. **W. F. Hughes** was appointed general mine foreman of the Wheelwright mines and **Pat Adams** was appointed mine foreman of mines Nos. 1 and 2 to succeed Mr. Hughes.

**Walter Hochschild** is now president of the American Metal Co., succeeding **Harold K. Hochschild**, who was reelected chairman of the board. All other officers of the company were reelected to their present positions.

**Holly W. Sphar**, assistant secretary and assistant treasurer of the Pocahontas Fuel Co., Inc., since 1940, has been elected a vice-president of the company.

**John W. Harshbarger** has accepted a field administrative job with the U. S. Geological Survey. He had been assistant professor of geology at the University of Arizona, Tucson.

**J. P. Hesler**, formerly in the mining engineering department of the Potash Company of America, is now in the safety department as assistant safety engineer.

**J. Frank Geary**, inventor of the Geary reagent feeder and the Geary-Jennings sampler, has been appointed engineering administrator of Southwestern Engineering Co.

**Loren J. Westhaver** has been elected director and vice-president and manager of operations of Geneva Steel Co. and Columbia Mining Co., succeeding **R. G. Glass**, retired.

**E. C. Perkins**, former manager of sales of Appalachian Coals Inc., has been appointed president of Webb Fuel Co. and vice-president of Webb Coal Mining Co. **George F. Kelly** was elected treasurer of Webb Fuel Co. and assistant treasurer, Webb Coal Mining Co.

**Robert T. Wood** has been named chief metallurgist of magnesium products for the Aluminum Company of America.

**Frank Taft** is now superintendent of operations at the Signal Mining Co. of Kellogg, Idaho. He directs operations at the company's properties at Bannock, Mont.

**J. H. Pollard**, formerly associated with major sulphur companies, has opened his own consulting office at 1515 West Main, Houston, Texas.

**Joseph A. Reid**, manager, titanium division, National Lead Co., has been elected a director and member of the executive committee of the company.

**W. F. Distler**, former assistant mine superintendent of the Miami Copper Co., has been named mine superintendent.

**Edward V. Hardy**, former assistant superintendent of the Murray Smelter and recently metallurgist at the Garfield smelter of the American Smelting and Refining Co., has been named assistant superintendent at Garfield.

## —Obituaries—

**Oscar R. Howard**, 74, died at his home in Los Angeles, Calif., May 13. He was president of the Tom Reed Gold Mining Co., Oatman, Ariz.

**William C. Hanson**, 65 former president, National Iron Co., died on June 6 in Duluth. His latest interest was in the engineering phases of taconite development with Pickands Mather & Co.

**Chambers Kellar**, 83, general counsel for Homestake Mining Co., died May 19. He had headed the company's legal department since 1904.

Mr. Kellar was well known to mining men throughout the United States for his many addresses before the American Mining Congress directed against government encroachment upon the mining industry. In the passing of Chambers Kellar, the mining industry has lost a well-informed and staunch supporter.

**A. L. Engels** died early in May at Harvey, Ill. He was well known in Arizona and Michigan mining circles, having supervised the construction of the Shattuck Denn Mining Corp.'s milling plant at Bisbee, Ariz., in 1917, and more recently been a member of the Copper Range Mining Co.'s staff.

**R. E. Zimmerman**, professor of mineral preparation, Pennsylvania State College, has left for Turkey where he will represent the Koppers Co., as mining and preparation consultant.

**John G. Baragwanath** is now vice-president of the Shelter Rock Corp. in charge of mining and petroleum activities. He was formerly director of exploration for the Freeport Sulphur Co.

**S. F. Ravitz**, formerly at the Salt Lake City station of the U. S. Bureau of Mines, is now on the staff of the University of California at Berkeley in the extractive metallurgy department.

**Richard E. Hoagland**, formerly manager of by-product sales for Kaiser Steel Corp., has been appointed vice-president and assistant general manager of Utah Fuel Co.

**R. C. Riedinger** has been appointed general coal traffic manager of the Chesapeake & Ohio Railway. Prior to his recent appointment he was assistant to the vice-president in charge of the railroad's fuel purchases.

**W. C. "Pat" Page**, formerly general manager of western operations for the United States Smelting Refining & Mining Co., was elected vice-president and general manager of western operations at the company's meeting of the board of directors on June 14.

**Frank M. Jenifer**, president, Pacific Coast Borax Co., died May 27 in Los Angeles. He was also a vice-president of the United Potash Co. He had been with the borax company since 1926, when he joined the organization as assistant general manager.

**John R. Bartlett**, 69, assistant general superintendent of mines, Anaconda Copper Mining Co., died in Butte, Mont., May 19 after an extended illness. He was a graduate of the University of Michigan in 1904. He came to Butte shortly thereafter and joined the staff of the Anaconda Copper Mining Co. after a short period of employment with the North Butte Mining Co.

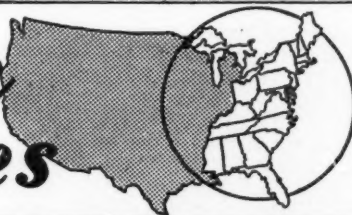
**J. S. (Sam) Coupal**, 66, consulting mining engineer, died at Phoenix, Ariz., June 4, following a cerebral hemorrhage suffered earlier in the day. Coupal was state president of the Arizona Small Mine Operators Association and former director of the Arizona Department of Mineral Resources. He was a graduate of Massachusetts Institute of Technology, class of 1907, and had practiced his profession in many western states and in Alaska, Mexico, Peru and Venezuela.

# NEWS

## and VIEWS



### Eastern States



#### Underground Gasification Process

Steady progress has been reported in the experiment in underground gasification of coal being made at the Gorgas mines of the Alabama Power Co., a cooperative program with the U. S. Bureau of Mines. Dr. Milton H. Fies, reporting on progress, stated that since the start of the project, more than 14 months ago, engineers have been able to make a gas the heat of which will raise steam in a boiler or generate power in a gas turbine engine.

Current efforts, according to Dr. Fies, are directed at bringing out a regular supply of producer gas. If this aim can be accomplished, it will be possible to make synthesis gas from which gasoline and diesel oil are made.

#### Roof Control Section Formed

A roof control section has been established in the Bureau of Mines headquarters to provide increased technical advice and consultation service on roof-control problems. Chief of the new section is Edward M. Thomas, mining engineer who has been in charge of the roof control unit set up last August in the Bureau's health and safety division at College Park, Md.

The new unit was primarily concerned, in 1949, with investigating methods for preventing accidents from falls of roof. Considerable time was devoted to experimental installations on roof bolting.

Up to the first of 1950, it was estimated that about 200 coal mines had adopted roof bolting on an experimental basis. In these mines, approximately 714,000 roof bolts had been installed and were supporting an estimated 14,000,000 sq ft of roof surface.

#### Mobile Air Pollution Lab

Pennsylvania's Bureau of Industrial Hygiene has recently placed in service an air pollution and industrial hygiene mobile laboratory for field sampling and quantitative and qualitative analyses of atmosphere in industrial communities and factories. The laboratory will play an important part in the state's effort to keep the atmosphere in industrial communities free from hazardous or annoying fumes, dusts and gases.

More than 25 scientific devices are mounted in the vehicle, which has a gasoline, motor-driven generator for electrical service, water tanks and a large variety of equipment to collect and test field samples.

#### Kentucky Coal Reserves Map

More than 350,000,000 tons of high bituminous coal in the Hyden quadrangle, Leslie, Clay and Perry Counties, Ky., have recently been mapped and appraised by the U. S. Geological Survey. Copies of the map, C 5, on the fire clay and Whitesburg coals, may be obtained from the Director, U. S. Geological Survey, Washington 25, D. C., at \$1 each.

#### Davis Coal Builds New Plant

Near Coaldale, Ky., the Davis Coal Co. is developing its new Hazard No. 4 mine. A modern preparation plant now under construction is expected to be completed within several months.

#### Henry Krumb Scholarships

For the year 1950-51, the Henry Krumb scholarship awards have been made by the School of Mines of Columbia University to the following men: M. S. Abrahams, R. S. Mattson, Thomas Simpson, Robert Bakish, J. W. Semmel, Jr., W. M. Hirthe, D. W. Mitchell, R. J. Murphy, D. L. Rainey, and Alan Smee.

#### Gant Coal Opens New Mine

A new four-track tippie mine located on the Illinois Central Railroad is operated by the Gant Coal Co. Located near Greenville, Ky., the mine produces coal from the No. 6 seam. The company is also producing coal from the No. 9 seam near Beech Creek, Ky.

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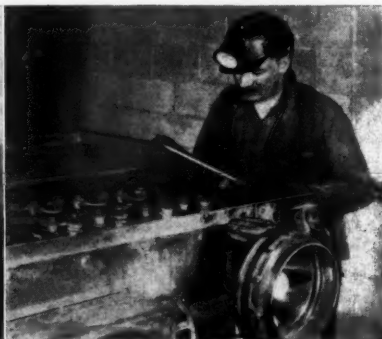
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## Geologists Organize New Professional Institute

With the objectives of coordination, cooperation and service, geological professions of the United States have formed the American Geological Institute, which operates as an affiliate of the National Research Council. The Institute is particularly interested in broadening the applications of geological science to industrial needs, and, to accomplish this aim, seeks the cooperation of the mining and mineral industries.

Scientific societies working together comprise the American Geological Institute. The affairs of the organization are directed by a board composed of two representatives from each of the following member societies: the American Association of Petroleum Geologists, American Geophysical Union, American Institute of Mining and Metallurgical Engineers, Geological Society of America, Mineralogical Society of America, Paleontological Society, Seismological Society of America, Society of Economic Geologists, Society of Economic Paleontologists and Mineralogists, Society of Exploration Geophysicists, and the Society of Vertebrate Paleontology.

Full information about the Institute and its activities are available from David M. Delo, executive director, American Geological Institute, 2101 Constitution Avenue, N. W., Washington 25.

## National Safety Competition

The mineral industries attained in 1949 the best safety record in the 25-year history of the national safety competition. In naming the silver anniversary winners of the coveted Sentinels of Safety trophies, the U. S. Bureau of Mines reported that 202 mines and quarries had injury-free records last year.

In 1925 the national safety competition was started by the Bureau of Mines upon the recommendation of former President Herbert Hoover, then serving as Secretary of Commerce.

Beginning in June, mineral operations with the best safety records in each of the six groups will receive national recognition as leaders in mine and quarry safety. Winners will be awarded bronze Sentinels of Safety trophies and the Sentinel of Safety flags by the *Explosives Engineer* magazine. Individual certificate of achievement of safety will be presented to each man in the winning plant. Trophy winners for 1949 are as follows: anthracite mines: Stevens Shaft Mine, Kehoe-Berge Coal Co. Bituminous coal mines: Reliance No. 7 Mine, Union Pacific Coal Co. Metal mines: No. 2 Mine, American Zinc Co. of Tennessee. Nonmetallic mines: Bellefonte Mine, National Gypsum Co. Open-pit mines: Embarrass Mine,

Pickands Mather & Co. Quarries; Donlonah Quarry, Tennessee Coal, Iron & Railroad Co.

Increased interest is being shown in annual safety competition as indicated by the record enrollment of 646 mines and quarries in the 1949 contest. According to Forrest T. Moyer, chief, Accident Analysis Branch, U. S. Bureau of Mines, this entry list is more than three times the original enrollment in the first competition held in 1925.

Members of the 1949 committee of award includes: Ned H. Dearborn, president, National Safety Council; Julian D. Conover, secretary, American Mining Congress; William Green, president, American Federation of Labor; J. D. Battle, executive secretary, National Coal Association; A. T. Goldbeck, engineering director, National Crushed Stone Association; A. J. R. Curtis, assistant secretary and safety director, Portland Cement Association; and Dan Harrington, consulting engineer.

## Coal Geology Lab Dedicated

On May 20 the U. S. Geological Survey formally opened the new coal geology laboratory located in Orton Hall on the campus of the Ohio State University, Columbus, Ohio. The laboratory is designed to carry on coal research related to geology with the object of advancing the Geological Survey's diversified program for the study of coal, both through original fundamental research and through the investigation of problems encountered by parties working in the field.

Detailed laboratory studies are expected to bring about a better understanding of the composition and geologic occurrence of coal.

## Anthracite Flotation Plant

The Lehigh Navigation Coal Co. has announced plans to build a \$500,000 addition to its Coaldale, Pa., No. 8 colliery which will consist of a flotation plant and other new facilities.

## Roof Bolts Improve TCI Operation



Safety at the underground operations of the Tennessee Coal, Iron & Railroad Co. have been greatly improved by the installation of roof bolts to support more than 5,000,000 sq ft of its coal and iron ore mines. Elimination of upright timber supports has cleared working areas to permit freer movement of men and equipment.

No accidents from fall of roof in either coal or iron ore mines have been caused directly by the new method of roof support at the company's operations. The frequency of accidents in TCI ore mines in 1949 was the lowest in the company's history; the first eight months standing at 8.32, a re-

duction of 54 percent from the same period in 1948.

Among the advantages apparent from the conversion to roof bolting is the improved quality of product. Prior to adoption of roof bolting, slate picked from mine-run ore averaged 275 tons per week. Now, practically no slate is picked. Another helpful improvement has been the reduction of the acid content of conditioned ore by about two percent. Rivet-grade steel is used for the bolts to provide a minimum ultimate strength of 56,000 psi, assuring that a 1-in. bolt will support 33,600 lb of roof on its threaded end and 44,000 lb on its anchored end.

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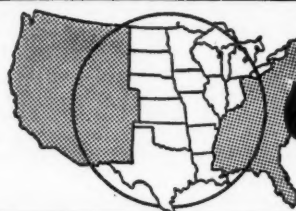
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# Central States

## Coal Gas Fuels Turbine

At the semi-annual meeting of the American Society of Mechanical Engineers held in mid-June at St. Louis, Mo., members were told that a satisfactory overfeed bituminous-coal gas producer can be made to supply fuel to a gas turbine. Coal gasification rates of 100-200 lb per hour per sq ft of grate area can be achieved.

The report was made in a paper by Bruce O. Buckland and Arthur Y. Hillman, Jr., of the gas turbine engineering division of the General Electric Co., and Harlan W. Nelson, Battelle Memorial Institute.

In a total of 93 tests, the effect of pressure, rate of gasification and fuel properties for three different producer arrangements and modifications were investigated.

## Lake Superior Safety

In Duluth, Minn., on May 18-19, the Lake Superior Mines Safety Council held its 26th annual safety conference. More than 600 safety experts from the Lake Superior region attended the meeting.

A wide variety of safety topics were discussed by authoritative experts including A. J. Fairley, assistant to the president, Snyder Mining Co.; Al Kolu, assistant safety supervisor, Pickands Mather & Co.; Dr. L. R. Gowan; J. H. Hearing, Jr., general superintendent, Oliver Iron Mining Co.; Stephen E. Erickson, beneficiation engineer, the M. A. Hanna Co.; Edward M. Thomas, roof control section, U. S. Bureau of Mines; E. K. Taylor, safety director, Zenith Radio Corp.; H. J. Rahilly, manager of mines, Anaconda Copper Mining Co.; and Forrest T. Moyer, accident analysis branch, U. S. Bureau of Mines.

## Homestake Scholarships

Three scholarships will be awarded by the Homestake Mining Co. to entering freshmen at the South Dakota School of Mines and Technology. The scholarships are available to graduates of South Dakota high schools. Two will be awarded to students interested in the mineral industries, and the third is available to a student registered in any branch of engineer-

ing. Awards will be made on basis of scholarship and aptitude for academic work, extra-curricular activities, character, personality and the need for financial assistance. The scholarships for \$150 per year are renewable throughout the full four years required for an engineering degree, provided that a "B" average is maintained. These scholarships are sufficient to cover cost of tuition and fees and represent one of the largest scholarships available to students at the school.

## Lake Creek Plant Nears Completion

This summer, Consolidated Coal Co. plans to place its new Lake Creek mine near Johnson City, Ill., in operation. The 500-ton-per-hour plant is reported to be a modern installation constructed at a cost of approximately \$1,000,000. All facilities have been

designed to reduce coal handling to a minimum.

Preparation equipment in the new plant includes a Bradford breaker to reduce rom to minus 6 in. and McNally-Norton washers. McNally-Vis-sac thermal dryers have been installed to remove excess moisture from the product.

Coal is brought to the surface by a belt conveyor which handles the 3500-4000 tons produced from the main haulage level at a depth of 235 ft.

## Largest Underground Iron Mine

When the Cleveland-Cliffs Iron Co. recently linked its Mather "A" and "B" mines at Ishpeming, Mich., it resulted in what is believed to be the largest underground iron mine in the world. The swing shift crew of the "B" shaft completed blasting of a connection to the "A" shaft's sixth level providing a direct underground connection between the two shafts, which are approximately 9000 ft apart.

The "A" shaft, leading producer of iron mined on the Marquette range, is aiming at the 1,000,000-ton plus production mark this year for the third straight year. Completion of the link with the "B" shaft makes this goal most likely, inasmuch as all ore produced from the "B" shaft will be counted in the total output for 1950.

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## QUINCY MINING COMPANY

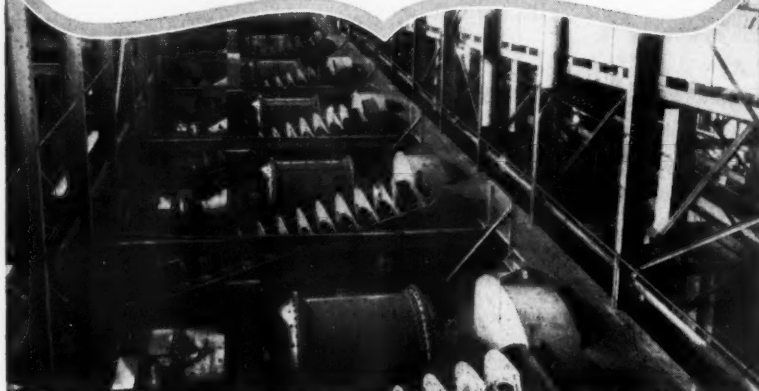
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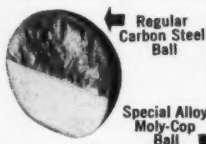
Quincy Mining Company's six 8 ft. x 6 ft. Hardinge Ball Mills on Torch Lake, Hancock, Mich.

Based on a 9 month test period ending June 30, 1949, the consumption of Sheffield Moly-Cop Balls was less than  $\frac{1}{2}$  as much as forged steel balls previously used by Quincy Mining Company in the six mills shown above. The forged steel

balls were consumed at the rate of 1.55 pounds per ton of ore ground as against .49 lbs. of Sheffield Moly-Cop balls.

Actual cash savings were more than \$30,000 in nine months, despite the original higher per-ton cost of Moly-Cop balls. The economy of Moly-Cop Balls has been proved in mining operations all over the world.

The harder martensitic structure of Moly-Cop Grinding Balls, their toughness right to the core, are the reasons for this longer grinding life and grinding economy. Your own ore-reduction costs can be reduced considerably, when you charge your mills with Moly-Cop Grinding Balls.



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Ingots, Blooms, Billets, Plates,  
Sheets, Merchant Bars,  
Steel Joists, Structural Shapes,  
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Welded Wire Mesh,  
Wire Products, Wire Rods,  
Fence, Spring Wire,  
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## Zeigler Buys Bell & Zoller

On the last day of May 1950, the Zeigler Coal & Coke Co. acquired the Bell & Zoller Coal & Mining Co. and its sales subsidiary. No change was contemplated in officials or personnel of the Bell & Zoller company and both firms will continue to operate under the same name.

Four mines operated by Bell & Zoller in Illinois and Kentucky have been leased on a profit-sharing basis from Zeigler Coal & Coke. Two mines at Zeigler, Ill., have an annual output of about 1,500,000 tons and other mines located at Madisonville and Mortons Gap, Ky., produce a similar amount.

Near Murdock, Ill., another mine is in the development stage with current production of about 700 tons per day. In view of present market conditions, this mine may be closed and held in reserve.

## South Dakota Miners Meet

A conference for miners and prospectors, sponsored by the Black Hills Mining and Industrial Association, was held May 18 on the campus of the South Dakota School of Mines and Technology in Rapid City. An inspection of the laboratory facilities at the School of Mines and the U. S. Bureau of Mines station was made following the noon luncheon. Subjects discussed at the conference included discussions of the services of the various departments of the school and the U. S. Bureau of Mines.

## Shaft Planned in Ironton

Pickands Mather & Co. is making preparations to put down a shaft on the Ironton property, Bessemer Township, Gogebic County, Mich. The mine will be operated for the Youngstown Sheet & Tube Co.

## Peabody Plans Increased Output of Two Mines

Two mines of the Peabody Coal Co. are expected to reach full production in January 1951. The No. 17 mine at Pana, Ill., now producing 1250 tons per day, will have a daily output of 9000 tons when full production is attained. Preparation facilities will be completed at this property this fall. Mine No. 40 will have an ultimate capacity of 4500 tons per day.

To provide the maximum of mechanical facilities for convenient production, the company installed new types of shuttle cars, belt conveyors, drills, timbering machines and roof bolting equipment at its various properties. In the annual report to the stockholders, Stuyvesant Peabody, Jr., reported that every effort is being made to more completely mechanize mining operations.

# That Men May Work in Safety

## Completion of John T. Ryan Memorial Laboratory Marks Long Forward Step in Accident Prevention

THE world's largest research laboratory devoted to the development of safety equipment for all industries, was dedicated as a memorial to John T. Ryan in Pittsburgh on June 14 by the Mine Safety Appliances Co. John T. Ryan, Jr., presided at the dedication ceremonies. Following the invocation by the Rev. Thomas F. Coakley, pastor, Sacred Heart Church, brief addresses were made by several speakers—George H. Deike, president, Mine Safety Appliances Co.; Ned H. Dearborn, president, National Safety Council; and Harry M. Moses, president, H. C. Frick Coke Co.

In the dedication address Mr. Dearborn hailed the laboratory as one of the most significant advancements in the history of this country's industrial safety movement, representing not only science at its best but human purpose at its finest. He stated:

"We are here to dedicate a building. Perhaps it would be more accurate to say we are here to dedicate a purpose, since the building itself, by virtue of its function, is already dedicated to one of the most justifiable uses to which any structure can be put. We are here, too, to give testimony to the man after whom the building is named."

John T. Ryan was the son and grandson of miners and began his underground work as a trapper boy when 12 years old. He was determined to educate himself and for several years worked in the mines and saved money for his schooling. He graduated in 1908 from Pennsylvania State College with a degree of mining engineering, and in 1911 joined the U. S. Bureau of Mines in the Safety and Mine Rescue Division. One of his early assignments with the Bureau was to assist in the recovery operations of a mine which had been destroyed by an explosion; this rescue work made such an impression on him that he later said: "As I stood there amidst the destruction and could see the desolation of the wives and mothers, the thought came to me—if I spend my whole life in doing what I can to lessen the likelihood of such terrible disasters, I shall feel in the end that my life has been well spent."

The Mine Safety Appliances Co. was founded in 1914 by John T. Ryan and George H. Deike—his friend and partner. The company was originally organized for supplying apparatus, equipment and instruments for pro-

tection of lives and property, and expanded from mining into all branches of industry on a world-wide scale and today is the largest manufacturer and supplier of safety equipment in the world.

Safety work in the new laboratory utilizes virtually every branch of science and engineering for developing protective equipment and instruments under a large staff of chemists, physicists, electrical engineers and other scientists. The many types of research instruments and equipment include high altitude chambers; dust, fume and gas chambers; a wind tunnel, and an electron microscope that permits

display in the rubber and plastics laboratory covered the development of protective hats and caps made of laminated plastic, and demonstrated the tests in which sharp, pointed missiles were dropped. In the dust laboratory various kinds of dusts were drawn from a sealed chamber through respirators to demonstrate their effectiveness in preventing inhalation of harmful airborne solids by workmen. Dust respirators perfected by the company and approved by the U. S. Bureau of Mines remove particles as tiny as 1/50,000th of an inch. Other exhibits in this laboratory included equipment for sampling and identifying dust particles, and instruments used in air pollution surveys.

Displays in the physiology laboratory consisted of instruments that administer oxygen for inhalation



The John T. Ryan Memorial Laboratory is dedicated to progress in industrial safety

study of dusts, and other substances at a magnification up to 100,000 times. The library contains a comprehensive collection covering the fields of safety and industrial health and hygiene. An experimental shop on the ground floor manufactures new models of instruments and equipment developed through research.

Following the dedication exercises, guests witnessed demonstrations and exhibits of research and testing procedures. In the electrical laboratory, an exhibit showed the history of mine lighting and the progress made in the miner's Edison electric cap lamp since it was invented in 1915 by Thomas A. Edison. The present miner's cap lamp has 100 times the illuminating intensity of Edison's first model. A

therapy in treating silicosis and other respiratory ailments, as well as for emergency treatment of drowning and suffocation victims. Another laboratory demonstrated preparation of chemicals used in gas masks and respirators for poisonous or noxious fumes. A breathing apparatus that generates its own oxygen supply, enabling its use in any type of unbreathable atmosphere, also was shown. Various other instruments for detecting poisonous or flammable gases were exhibited. One instrument, a carbon monoxide recorder, can detect as little as four parts of gas in a million parts of air; this is used for ventilation control systems for vehicular tunnels.

Director of Mine Safety Appliances Co.'s Research and Development is Dr. William P. Yant.





### Elkhorn Ships First Ore

Elkhorn Mining Co. has started shipping silver and lead ore from the Sophia shaft area of the old Elkhorn mine near Boulder, Mont. The ore is trucked to Boulder for rail shipment to the East Helena smelter. The company expects to ship two carloads of ore a week. Production comes from the 200-ft level where a recently opened ore body remains to be outlined by continued exploration.

Work will continue under Elkhorn auspices at the Free Enterprise mine, where Sunshine Mining Co., installed a prospecting hoist to push exploration of an area where uranium occurrences are shown. Sunshine withdrew its crew, but left the equipment and permission for Elkhorn to use it. Dr. Paul F. Kerr of Columbia University recently examined the project with Sunshine officials. The spot that is the center of uranium interest is described as 85 ft below the surface, just above an exploratory tunnel driven by Sunshine.

### U. S. Fuel Announces Scholarships

A four year scholarship for the study of coal mine engineering will again be offered by the U. S. Fuel Co., Salt Lake City, for sons of employees. S. J. Craighead, vice-president and general manager recently announced. This scholarship is similar to the one offered by the company last year, providing for four years of study at the University of Utah.

### Shoshone Increases Reserves

According to the annual report of the Anaconda Copper Mining Co., substantial tonnages of both shipping and milling grade lead-silver ore were developed in the Shoshone Mines group at Tecopa, Calif., during 1949. Steady exploration work increased reserves of ore materially and operations are understood to have been expanded recently. Shipping ore is under development to the 600-ft level in the Noonday mine, one of the three properties comprising the Shoshone group.

Seth K. Droubay, general manager at Shoshone as well as at the company's Darwin Mines, reported last fall that plant expansion was planned at Shoshone. Reports are that the company plans to sink the main Noon-

day shaft deeper and explore ground below the present producing area. Operations are reported normal at Darwin Mines, California's leading lead-zinc producer. A daily capacity of 125 tons of ore is being treated at the concentrating mill.

### Mingus Exploration

Although the Clarkdale Smelter of Phelps Dodge Corp., Clarkdale, Ariz., ceased operations on June 6 due to the depletion of ore reserves at the United Verde mine at Jerome, mining will not be affected immediately, as plans call for shipment of concentrates to the smelter at Douglas. In the meantime, Mingus Mountain Mining Co., subsidiary of Verde Exploration, Inc., is continuing its program of exploration for new ore bodies in the Jerome area. Both diamond drilling and geophysical methods are used.

### Coeur d'Alene Plans Sinking

The Coeur d'Alene Mines Corp. in Idaho has announced plans for sinking from the 2800 to the 3400-ft level. The new operation will be an offset shaft 1200 ft south of the main shaft to avoid long crosscut development. Several strong mineralized veins have been opened on the 2800 level but no commercial grade ore has been found in quantity. Geologists believe the 2800 level is a lean zone found in other mines in the same belt.

### Sheelite Mine Reopens

Nevada-Massachusetts Co. has resumed operations at its tungsten mines and mill near Mill City, Nev., president Charles H. Segerstrom has announced. He said the company normally employs 150-160 men and that negotiations have been completed for a one year working contract with the local union. The company suspended operations last June because of what the management termed unsatisfactory economic conditions.

### Dawson Sold for Salvage

The New Mexico coal mining town of Dawson—plant, equipment, housing and scrap material—has been sold by the Phelps Dodge Corp. to the National Iron & Metal Co. of Phoenix, Ariz. The Dawson mines were shut

down April 28 and most of the town's 300 families have moved away. Sixteen houses and the land were not included in the salvage sale. Some of these were retained by Phelps Dodge for employees who operate a 52,000-acre cattle ranch surrounding the town for the corporation. The others are occupied by employees of the Southern Pacific and the Frontier Power Co. which sells electricity to nearby communities. The power company will continue to operate until coal stockpiled above ground is exhausted. According to Samuel Shapiro, president of the Phoenix salvage company, the school, gymnasium, a theater, hospital, church and many homes will be razed in the salvage operations. Other salvage includes the coal cutting and mining equipment, mine tipples, administration building, coal washery, machine shop and carpenter shop, as well as underground pipe and rails.

### California Manganese

Considerable interest is being shown in manganese mining in Plumas county, Calif., and other nearby areas. Utah Construction Co., is reported preparing to increase production from the Sunset manganese property near Canyon Dam, from which ore was formerly shipped to the Geneva Steel plant in Utah. Equipment installed by Utah Construction Co., includes power shovels, bulldozers and tractors. Western All-State Manganese Mining Co., has leased five manganese properties in Butte, Plumas and Trinity counties.

Manganese has been opened in five pits at the Sunset mine, owned by W. K. McMillan and associates of Reno and San Francisco.

### Artillery Peak Developments

Approximately 2000 ft of haulage and ventilation tunnels are being driven by the U. S. Bureau of Mines in its development of the huge low-grade manganese deposit at Artillery Peak in western Arizona. J. H. East, Jr., of Denver, regional director for the Bureau, stated that the deposit was estimated by Bureau engineers in 1934 to contain more than 50,000,000 tons of manganese ore and private engineers have placed the tonnage even higher. The Artillery Peak deposit is on the Bill Williams River, about 40 miles north of Salome and 46 miles west of Congress Junction. The Bureau has established a camp near the mine and the exploration program is well under way. Extensive studies of the metallurgical processes for the ore have been made by the Bureau and these are continuing. Work at Artillery Peak is under the direction of W. R. Storms, chief of the Bureau's Arizona Mining Division. Charles Kumke is in active charge at the mine.

## Garfield Anode Plant in Production

On June 16 the \$3,500,000 anode casting plant of the American Smelting and Refining Co. at Garfield, Utah, began production. Blister copper cast into anodes will be sent to the new refinery being constructed at Garfield by the Kennecott Copper Corp.

## Jumbo Plans Increased Output

Gold production is to be materially increased from the Jumbo mine in the Awakening District, 40 miles southwest of Winnemucca, Nev. Mining in open pits will be increased from 500 to 1000 tons of ore and waste daily, with approximately 50 percent eliminated from the mill feed by screening. Capacity of the mill is to be raised from present 500 tons to 1000 tons daily before the end of this year. The Jumbo is now controlled by Austin-Jumbo Mines, recently incorporated by Winnemucca and Salt Lake City mining men.

## Butte Manganese Plant Reopens

Following a shutdown since last August, the Domestic Manganese and Development Co. has reopened its processing plant at Butte, Mont. At the present time the plant is working on government stockpiles of manganese from Philipsburg, Mont. Approximately 75 men are employed. Report of the resumption of operations was made by Dan E. McCarthy, chief clerk at the plant, who also said that John H. Cole, president and manager of the company, has been in Washington, D. C., for several months, where he is negotiating with the Treasury Department on contracts for processing manganese ores.

## Oil Shale Production Costs Cut

A recent announcement by the U. S. Bureau of Mines stated that mining costs at the oil shale mine near Rifle, Colo., have been lowered to 29¢ per ton. The cost of producing crude shale oil from 30-gallon-per-ton-shale, using the new mining and processing techniques, would be about \$1.50 per barrel. At the semi-annual meeting of the American Society of Mechanical Engineers, Bureau of Mines officials reported that the cost of gasoline, diesel oil and heating oil made from the crude shale oil would be about 8.4¢ per gallon. It was estimated that 300,000,000 bbl of shale oil could be produced from the 500-ft thick measure of the Green River formation spread over a 1000 sq-mile area of western Colorado.

In operation of the mine, a crew of 13 men have successfully produced at the rate of 148 tons per man-shift for underground labor and 116 tons per man-shift of total labor with a direct cost of 29.2¢ per ton.



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# Give to Conquer Cancer



**T**HE fight is on to save more lives in 1950! Now is the time to back science to the hilt in its battle against cancer.

Important gains have already been made. Last year, 67,000 men, women and children were rescued from death by cancer. Many more can be saved—if *you* resolve to save them—if *you* strike back at cancer.

Give! Give your dimes and quarters and dollars. More treatment facilities are needed,

more skilled physicians, more medical equipment and laboratories. The success of great research and educational programs depends on your support.

Your contribution to the American Cancer Society supports these vital efforts. It helps guard your neighbor, yourself, your loved ones. So this year, strike back at cancer . . . Give more than before . . . Give as generously as you can.

## AMERICAN CANCER SOCIETY



## Montana Miners Meet

On July 30-31 members of the Montana Mining Association plan to meet at the Finlen Hotel in Butte, Mont. William H. Hoover, president, Anaconda Copper Mining Co., will be the banquet speaker. Convention goers will be welcomed by John W. Bonner, governor of Montana. High calibre entertainment will be arranged under the supervision of John Good, manager, Anaconda employees' club.

On the evening of July 31 the annual banquet will be held in conjunction with a meeting of the local section of the AIME. A. B. Martin, chief of the Montana Power Co. and chairman of the Montana Section of the AIME, will be toastmaster.

Dr. George E. Sokolsky, noted columnist and historian, will be guest speaker at the July 31 luncheon, when he will speak on "The Future of Gold."

The business section of the annual meeting will be opened by a welcome to Butte by Hon. Thomas R. Morgan, mayor of Butte. The list of top-flight speakers includes the Hon. Sumner T. Pike, chairman, Atomic Energy Commission, who will speak on "The Economics of Uranium Production"; Julian W. Feiss, assistant to the director, U. S. Bureau of Mines, on the "Operation of Experimental Mine at Mt. Weather, Va."; Evan Just, editor,

*Engineering and Mining Journal*, on "The Impact of the Cold War on Domestic Mining"; and John P. Spielman, dean, School of Mines, State College of Washington, on a subject of importance to the mining industry. Many other outstanding men of importance to the mining industry will be included on the program.

## New Park Announces Uranium Exploration

At the annual stockholders meeting of the New Park Mining Co., Keetley, Utah, W. H. H. Cranmer, president and general manager, announced that preliminary studies are under way and exploration for uranium near Marysville, Utah, will soon begin. Activity in the Marysville area is high since the recent discovery of primary uranium ore in that region.

## Idaho-Maryland Mines

The Idaho-Maryland Mines Corp. is accelerating exploration, development and mining programs at its Idaho and Brunswick mines at Grass Valley, Calif. Development of the wide ledge on the 2700 level has been expedited by extension of a large raise to this level from the 3200-level workings of the Brunswick. Diamond drilling has located a new vein on the 2400 level

and promising ledges on the 2700 level.

The extension of a large ore body found last year on the 2400 level is being sought on the 2700 level. The body has been exposed for a length of 700 ft on the 2400 level. Development of a massive vein found in 1948 on the 2700 level has been pushed ahead by the completion of the raise from the Brunswick mine. Diamond drilling operations are being continued in virgin areas of the company's properties.

Idaho-Maryland is operating the Brunswick and Idaho mills and is milling about 600 tons of ore a day, with the bulk of the product obtained from the Brunswick. Lessees are mining profitable ore in the Idaho and the company will try to extend the work necessary for leasing operations. Erection of a steel head frame at the Brunswick is scheduled this year.

In 1949, the company milled 210,152 tons of ore and produced gold worth \$2,158,773, yet operations resulted in a loss of \$75,520 after depletion and depreciation charges totaling \$207,269. Ore milled last year averaged higher than \$10 a ton, compared with less than \$9 in 1948. Idaho-Maryland Mines is the second largest American lode gold producer, ranking next to Homestake at Lead, S. D.

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*New Traction Drive with Forward and Reverse*



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READY FOR LOADING  
AT BETTER THAN  
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The new Parmanco HI-Speed Horizontal Drill is completely redesigned around a 40-H.P. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time—a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition, the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

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## N. M. Coal Output Down

Coal mining in the Gallup, N. M., field is rapidly losing ground. The market has dwindled principally because of the uncertain supply situation provoked by labor unrest and consequent conversion of railroads from coal burning engines to Diesel power units.

The two largest mines in the field, the Defiance and the Gamero, are now operating only one day a week. Eight smaller operators are having similar difficulties. Approximately 200 people are presently employed in an industry that previously employed 2000. Production has dropped from 801,047 tons in 1930 to 103,709 tons in 1949. The present production supplies the rapidly dwindling railroad utilization of coal, largely by the Santa Fe system, and domestic users in New Mexico and Arizona. Production will be further reduced when the proposed San Juan-California natural gas line goes through. This change will about wipe out the small producers.

## Long Connection Made

Polaris-Silver Summit Mining Co. now has an underground connection with the 2800-ft level of the adjoining Silver Dollar Mining Co. Through a raise extended from the 3000-ft level in the Silver Summit properties, badly needed air circulation will be provided on this deep level.

The survey was conducted by Gordon Peck and Wallace Crandall over a distance of 3½ miles, through a vertical height of over one-half mile, along crooked drifts, and down three separate deep shafts, and up a raise to "close the survey." The connection was made within one foot or so of absolute "closure."

Ernest C. Gaedinger commended the two engineers and their crews for the success they achieved in making an extremely difficult underground survey.

## Mt. Con Wins Butte First Aid Contest

The twenty-sixth annual first aid contest of the Anaconda Copper Mining Co. at Butte, Mont., was won by the No. 1 team representing the Mountain Con mine. In this feature event of the annual Butte Miners Union Day, held at Columbia Gardens on June 13, the winning team scored 99.68 percent to win over a field of 12 entrants.

The contest, described as the finest ever held, attracted one of the largest crowds in more than a decade. The teams were so well trained that there was only 2.16 percent difference in scores between the winners and last place team. Placing second in the contest was the Anselmo mine No. 1 team, with a score of 99.40 percent, and in third place was the Sampling department team with a score of

99.20 percent. First prize consisted of a purse of \$200, with \$175 for second, \$105 for third and \$35 for each of the other contestant teams.

Members of the Mt. Con team were Pete Yerkich, captain, John Casagrande, Art Turner, Albert Gnidie, Charles Harney, John Saunders, James Malkovich, and J. M. Harkins, safety engineer. T. C. Wise is superintendent and V. D. O'Leary is foreman of the Mountain Con mine. Officials of the contest were L. H. McGuire, U. S. Bureau of Mines, Seattle, field marshal; O. A. Dingman, Montana School of Mines, Butte, chief judge; H. H. McMillan, Mine Safety Appliances Co., timekeeper; W. F. Flanick, recorder and Al Williams, recorder.

## Whinnery Schedules Production

The Whinnery Mining Co. is scheduling the milling of gold ore at its properties in the Masonic district near Bridgeport, Calif. The mill, installed late in 1949 at the Sarita mine, has a present capacity of 100 tons. Whinnery controls the Chemung, Sarita and Pittsburg-Liberty properties, all notable early-day gold producers in the Masonic district. The first ore to be milled will be taken from the Pittsburg-Liberty.

At the Sarita, the main ore body is 65 ft wide, developed to a depth exceeding 200 ft with sinking progressing. Several small ore shipments were made last year to the Dayton Consolidated mill near Virginia City, Nev.

## Hercules Opens New Ore

The old Hercules mine at Burke, Idaho, owned by Day Mines, Inc., has developed a new commercial sized vein of silver-lead ore on the 1000-ft level after being closed down for 20 years. The mine formerly produced more than \$21,000,000 in dividends.

## Yuba Boosts Operations

Yuba Consolidated Gold Fields is operating seven giant dredges in the Yuba River country of California and is remodeling its No. 3 dredge on the Feather River east of Gridley in Butte County; four jigs have been installed replacing gold recovery sluices. One dredge in the Yuba operates to a depth of 125 ft below water level, and most of the dredges are handling 450,000 cu yd of material monthly.

Redredging of an extensive acreage in the Yuba area is expected to start this year. The company recently resumed dredging at its Sunny View property south of Chico, Butte County.

## Ajo Smelter Nears Completion

The New Cornelia Branch, Phelps Dodge Corp., reports that the \$7,000,000 smelter being constructed at Ajo, Ariz., is nearing completion and actual operation of the plant is scheduled for July. While the plant has been de-

signed for the smelting of New Cornelia concentrates, a limited quantity of custom ores for fluxing purposes can be accepted. Shipments to be acceptable must be limestone ore or siliceous ore containing an abundance of quartz. "With either type," said Walter C. Lawson, manager of the New Cornelia Branch, "the ore will have to have sufficient values in gold, silver or copper to permit the shipper to mine and transport it and take care of the smelting charge."

## Tamarack Mine Opens Ore in Depth

Day Mines, Inc., is reported to have average grade milling ore across 11 ft of the Watson vein on the 3300-level of the Tamarack mine in the Coeur d'Alene district of Idaho. The 3300-ft level is the lowest working level of the Tamarack. It is 300 ft below previous workings and is 1800 ft below Burke Canyon.

## Tiger Mine Drilled

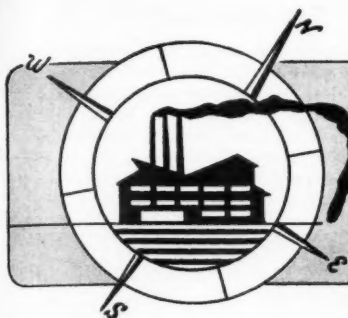
The U. S. Bureau of Mines has completed a core drilling program at the old Tiger lead-silver mine near Crown King, Ariz.

## Coronado Prepares for Production

The Coronado Copper & Zinc Co. is making preparations to resume mining and milling operations at its Johnson Camp mining properties near Dragoon, Ariz. The mine and mill were closed down about a year ago, following the sharp drop in metal prices. R. W. Moore, 1206 Pacific Mutual Building, Los Angeles 14, president and general manager, is at the mine supervising the preliminary work. He is assisted by Fred Gray, manager. When in full operation, the Coronado mine payroll numbers about 125 employees. Shortly before the shutdown the mine was producing at the rate of 6300 tons monthly of copper-zinc ore.

## Congress Mine Fire

A fire of major proportions is burning in the No. 2 shaft of the old Congress mine, near Congress, Ariz. It was started May 15 by teen-age boys who set fire to the shaft timbers at the 1225-ft station in an effort to smoke out bats. That the boys escaped with their lives is considered little short of a miracle. At the request of the owner, E. A. Colburn, Jr., an inspection was made by M. L. Williams and L. A. Van Fleet, safety representatives attached to the Phoenix safety station, U. S. Bureau of Mines. Their examination revealed the necessity of sealing the No. 2 and No. 3 shafts, and the east and west portals of the McKinley tunnel. Any plans which the owner may have had to operate the mine in the near future must be abandoned for an indefinite period.



# Manufacturers Forum

## Long Life Non-Renewable Battery

A non-renewable, air-depolarized, add-water type primary battery, the "Carbonaire," has recently been introduced by Thomas A. Edison, Inc., West Orange, N. J. The size now available is suitable for such applications as alarm systems, laboratory apparatus, telephone and telegraph installations, time clock systems and other services that require a reliable, independent source of low voltage d-c energy. Carbonaire batteries will supply enough electricity to keep a switch-lamp going for ten months to a year with only occasional inspections. The Carbonaire is not chargeable and is replaced when expended.

## Reverse Trolley Wire

Contracts have been negotiated with the Hawkes & Nitz Mfg. Co. by the Elreco Corp., Cincinnati, Ohio, to manufacture the reverse trolley wire system described on page 36 of this issue. Elreco will be the sole manufacturer of this material.

## Roof Bolting Unit

Combination drilling and bolting heads for application to the Baker timbering machine makes it possible to save time on roof bolting and timbering with the same machine. The new device, manufactured by the Baker-Raulang Co., Cleveland 2, accepts a standard rotating drill and is mounted on trunions so that it may be quickly rotated to bring the torque wrench into position, thus making it a one man operation. The manufacturer claims that an average hole can be drilled in  $1\frac{1}{4}$  to 2 minutes while 1 to  $1\frac{1}{2}$  minutes are required for inserting and tightening the bolt.

## Rubber Pinch Valve

For handling corrosive liquids, semi-solids and dry granular materials, the Ray Wilcox Co., Philadelphia, has designed a rubber pinch valve applicable to any line where the material being transported is difficult to handle or injurious to metal valves.

The manufacturer claims that the Wilcox Rubber Pinch Valve always closes easily and positively because

the rubber compresses around coarse particles and overcomes difficulties encountered with metal valves where coarse particles obstruct closing.

## Gas Detector

A unit built to work continuously as a gas detector to signal the presence of over 100 inflammable and explosive gases is produced by the LOR-ANN Instrument Co., Inc., New York 17. Controls are provided so that the gas detector will not only indicate a hazardous condition, but will also operate fans, valves, etc., to eliminate any dangers. The LOR-ANN Gas Detector bears the Underwriters' Laboratories label and is listed under the Re-Examination Service of the Underwriters' Laboratories, Inc.

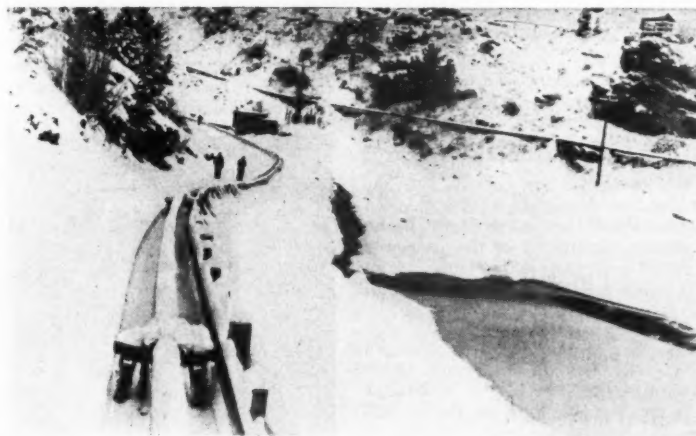
## Lead Dust Respirator

A respirator designed for use for all known toxic dusts which are not significantly more toxic than the lead is available from Pulmosan Safety Equipment Corp., Brooklyn, N. Y. The light, compact unit uses a single chemically treated filter said to provide low breathing resistance and low placement cost.

## Automatic Welder

For production welding and hard-facing, an automatic welding machine is built by Leader Welding and Mfg. Co., Berkeley, Calif. The unit operates on either 220 or 440-v., a-c power. Its head is built to handle all sizes and types of automatic wires to operate on a wide variety of parts.

## Unique Transmission Line



The U. S. Bureau of Reclamation's  $13\frac{1}{2}$  mile Alva B. Adams Irrigation Tunnel, which passes through the Continental Divide, has a 69,000-v power transmission line suspended throughout its length to transfer power between generating plants on both sides of the Divide. General Electric had a difficult task in making the installation as all material and men had to be brought into the 9-ft, 9-in. diam tunnel from one end.

The cable is of the high-pressure, gas-filled type which utilizes a  $5\frac{5}{16}$  in. diam steel pipe as a container. The pipe is welded together to form one continuous pipe which is hung from the tunnel roof where it will be just above the normal water level. The pipe is filled with nitrogen gas at 200-lb pressure to improve the electrical strength of the paper insulation of the copper conductors and prevent air and water from entering in case of leaks.



### Turn-Over Belt Tests

Extensive turn-over belt tests have been conducted by the National Iron Co. of Duluth, Minn. in connection with Cleveland-Cliffs Iron Co.'s considering an installation of this type at its Mather "B" mine in Michigan. With the cooperation of Grover Holt, Joe Haller and Kelley Campbell of Cleveland-Cliffs Iron Co., and Ralph Zettel of Chain Belt Co. the desired data was acquired. The belt, furnished by the B. F. Goodrich Co., was of standard construction as used by the mining industry.

The basic reason for turning over the return strand of a conveyor belt was to accomplish several improvements, including the ability of the belt to return to its own adhering surface accumulation of material to the loading point with no spillage between the head and tail-end twists. In this manner, clean-up areas could be confined to the short distance at the end of each conveyor. With only the clean pulley side of the belt encountering mechanical equipment, considerable saving in abrasive wear on pulley and idler surface is to be expected. Unlike the average conveyor belt which assumes a concave set due to being troughed under load and consequently wears the surface of the turn idlers unevenly, this condition no longer exists with a turned-over belt.

### Pilot Plant Reduction Crusher

A laboratory or pilot plant reduction crusher designed to reduce ½-in. feed to as fine a product as ten mesh with a single pass is available from The Mine and Smelter Supply Co., Denver, Colo. The Massco Gy-Roll Reduction Crusher is said to provide a product comparable to that obtained by commercial reduction crushers to make an ideal feed for ball mills or rod mills, laboratory pulverizers, or gravity concentration operations. The machine was developed by Dean A. W. Fahrenwald of the University of Idaho to replace equipment in the category of rolls and the coffee mill. The crusher is available in both a 6 in. and 10 in. size.

### Positive Grip Tap

A trolley tap featuring a bronze clamp for positive grip on the trolley wire is available from Mosebach Electric & Supply Co., Pittsburgh, Pa. The Mesco Clamp Type Tap No. 1059 will give 2% in of positive contact on any grooved wire. When the jaws are closed on the wire, a twist from the tap will effect a lock washer action on the threads so that the jaws will not loosen unless the tap is given a turn in the opposite direction. Thumb screws are provided to lock the fuse holder in place and prevent it from turning while the clamp is being actuated.

### Portable Air Compressors

Two new portable air compressors are available from the Worthington Pump and Machinery Corp., Harrison, N. J. Two-stage, air cooled compressors with a 30-cu ft capacity at 100 psi, have a maximum operating pressure of 150 psi. The units are designed for light-weight use including operating air tools, light blasting and chipping, powering paint guns and spraying.

### Reagent Feeder

Manufacture and distribution of the Clarkson Reagent feeder has been taken over by the Clarkson Co., San Francisco. This reagent feeder is constructed in various types of chrome-nickel steel and units have a capacity range of from two drops to two liters per minute.

### Rear Dump Hauler

A new model rear-dump hauling unit is in production by R. G. LeTourneau, Inc., Peoria, Ill. The new model, E-9 Tournarocker, powered by the D Roadster Tournapull. Capacity of the unit is 9 tons or 10 cu yd heaped capacity. Construction is such that the load is carried down between the wheels, providing a low center of gravity for improved stability. With its electric steering arrangement and high maneuverability, the machine is able to turn around in a 14 ft 5 in. radius circle.

### Speed Control Drive

A Texrope automatic Vari-Pitch sheave developed by Allis-Chalmers engineers is reported to be economical and efficient for controlling speed in applications requiring frequent



changes or for making adjustments without shutting down. The drive is said to be particularly applicable to high starting torques and to permit the belt to ride at smaller pitch diameters during acceleration. The illustration shows a Vari-Pitch sheave used for speed control of a pan feeder in the washing plant of the Hawkins mine of Cleveland Cliffs Iron Co., at Nashwauk.

### Fluorescence Comparator

Analysis of chemical, mineral or other samples under ultraviolet light is said to be possible in broad daylight using the Fluoretor black-light source. Construction of the unit permits swiveling of the battery and power-supply housing to the optimum angle for convenience in holding the



unit for observations of materials in the housing as well as for direct examination of samples in place. In operation, the beam of ultraviolet radiation is projected into a light-tight housing provided with a lens and eyepiece assembly which permits direct observation of the fluorescing sample. The instrument is available from Menlo Research Laboratory, Menlo Park, Calif., at \$49.50.

### Car Unloader

Heyl & Patterson, Inc., Pittsburgh, Pa., produce the Kinney car unloader to remove frozen coal out of hopper cars without the use of heat. The spade-like end of the unit can be employed to pick the coal or it can be made to swing through an arc and move coal down into previously made openings. The manufacturer reports that the Kinney car unloader enables one man to unload a 70-ton car of frozen coal in 20 minutes or less.

### Coal Froth-Flotation Unit

A froth-flotation separation unit has been added to the line of coal preparation equipment produced by the Wilmot Engineering Co., Hazleton, Pa. A single unit is said to have effected an average increase of 35 percent of the yield of marketable fines in pilot plant and field tests.

Advantages claimed for the unit are economies in floor space, operating time and power and labor. Units are available with clean coal capacities ranging from 9 to 80 tons per hour.

### Water Spray

For removing sticky impurities in the preparation of coal, ores, sand and gravel, etc., Pyramid Screen Co., New York 7, has designed its "Cyclo-Spray" to impart a whirling motion to the water, claimed to effect greater dispersion of the particles and more efficient cleaning.

## Sample Recovery

An attachment for the Hossfeld rock drill that is reported to successfully adapt the unit for prospecting has recently been announced by the Hossfeld Manufacturing Co., Winona, Minn. The attachment pumps water through the drill and recovers cuttings from the gas-powered drills designed to reach 70 ft in depth.

The drill itself is mounted on pneumatic wheels for convenient movement from hole to hole in prospecting operations.

## High Purity Battery Water

A portable deionizing apparatus is designed to provide ideal water for the industrial user of storage batteries. The unit, called the Deeminizer, delivers water of high chemical purity in quantities up to five gallons per hour. The product is said to contain only one part of ionic solids per 100,000,000 parts of water. The Deeminizer is manufactured by Crystal Research Laboratories, Inc., Hartford, Conn.

## Planes Serve Mines

In a recent announcement by the Ryan Aeronautical Co. a number of mining operations using airplanes to facilitate operations were described. The many advantages claimed for the use of planes included elimination of much lost time on ground trips, ability to haul heavy repair parts for various types of equipment and the avoidance of lost production time while waiting for repair parts to be supplied by ground transportation.

Plane users mentioned included the Badgett Mine Stripping Corp.; George H. Yoxheimer; Chester Weseman; the Bradley Mining Co.; Mountain Copper Co.; H. M. Holloway, Inc., and Patrick Butler and W. T. Dunn.

## Non-melting Lubricant

Plastilube, a lubricant developed for resistance to high temperatures and long service life, has been developed by the Warren Refining & Chemical Co., Cleveland, Ohio. The manufacturer states that Plastilube is adaptable for automotive and industrial use and that its special qualities should afford outstanding economy in use.

## Wedge-Slot Screens

Continuous slot wedge-slot screens have been adopted by the Hena.ick Mfg. Co., Carbondale, Pa., for use on high speed vibrating equipment, and for drainage and wet screening. Long life is reported in screening abrasive material and smaller, non-blinding openings are said to permit holding back much material formerly wasted or reprocessed.

## — Announcements —

James A. Gilruth, formerly advertising and sales promotion manager

of Gould Storage Battery Corp., has joined Harry W. Smith, Inc., as senior editor for the New York publicity firm specializing in serving industrial advertising agencies and manufacturers with technical markets and emphasizing new account development.



Lloyd E. Williams has been named Rocky Mountain regional manager for the Cummins Engine Co.

Harold B. Leland has been named vice-president—manufacturing for the Hood Rubber Co., a division of The B. F. Goodrich Co.

W. B. Stephenson was recently elected vice-president of The Allen-Sherman-Hoff Co. He has been connected with the company for 13 years and has served the last five as sales manager of the pump division. He has specialized in the application of pumps for moving high density abrasive materials.



Douglas E. Newton has been appointed general sales manager in charge of sales and sales promotion for the Denver Equipment Co.

David E. Davidson, formerly general manager of the Pershing Road plant of the Link-Belt Co., was recently elected vice-president for sales. Eugene P. Berg, formerly assistant general manager, has been appointed general manager of the Pershing Road plant.

Edmund A. Watson has been named general improvement engineer of the American Car and Foundry Co. to succeed John W. Sheffer who is retiring after 42 years' service.

Walter Geist has been elected to his ninth term as president of the Allis-Chalmers Mfg. Co. Other officers re-elected were W. A. Roberts, executive vice-president in charge of the tractor division; E. H. Brown, vice-president in charge of engineering development; W. E. Hawkinson, secretary and treasurer; J. A. Keogh, vice-president and comptroller; J. L. Singleton, vice-

president and director of sales for the general machinery division, and H. W. Story, vice-president and general attorney.

Stephen M. Wilson, Jr., has been appointed manager of the Joplin, Mo., district explosives sales office for Atlas Powder Co. D. J. C. Copps, former manager at Joplin, has been transferred to the company's general offices as special assistant to R. K. Gottshall, assistant general manager. Paul D. Mayfield became assistant manager of the Joplin District Office.

## CATALOGS AND BULLETINS

**CONVEYOR CARE.** *Carlyle Rubber Co., Inc., New York 7, N. Y.* Copies of an informative bulletin covering the installation, care and maintenance of rubber conveyor belting will be forwarded on request. Equipment and detailed instructions for patching and making major repairs is presented.

**EQUIPMENT AND MAINTENANCE.** *Stulz-Sickles Co., Newark, N. J.* Concise information is furnished on rebuilding and repairing worn buckets with manganese steel. The alloy, "Manganal," and its application to bucket repairs is illustrated in a folder available upon request.

**MATERIALS HANDLING.** *McNally-Pittsburg Mfg. Corp., Pittsburg, Kans.* Bulletin 501 illustrates and describes equipment for handling coal and stone in every phase of operation of a coal preparation plant, from the car hauls through the rotary car dumps to drying and feeding into cars for delivery to consumer.

**PORTABLE CABLE.** *The Okonite Co., Passaic, N. J.* A 56-page manual on flexible cords and portable cables is available on request from the Hazard Insulated Wire Works Division of the company at Wilkes-Barre, Pa. Complete technical information and dimensional data is presented covering the entire range, from the smallest 300-v cord to the largest 15,000-v shovel cable, including welding cables, jumpers, motor leads and mining cables. Splicing methods are described in a series of informative tables.

**PULSATOR JIG.** *The Dorr Co., Stamford, Conn.* Bulletin 2402, available on request, describes the hydraulically-actuated, fixed-screen jig which requires no mechanical power. The pulsator jig is claimed to be attractive for operation as a rougher device in small, relatively inaccessible placer properties as well as for normal field of use as a cleaner for rougher jig concentrates in dredge and mill installations.

**ROOF BOLTING.** *Pittsburgh Screw & Bolt Co., Pittsburgh 30, Pa.* The "Pit-Bolt" expansion unit and split-rod methods of supporting mine roofs are described in a new eight-page bulletin. Engineering drawings of all components of both systems and reasons for safety plus economy claims are included in this bulletin.

**TANKS FOR MINING.** *Black, Sivala & Bryson, Inc., Kansas City, Mo.* In a bulletin entitled "Products for Mining" the company describes its extensive line of tanks and "Safwalk" stair and walkway construction material.

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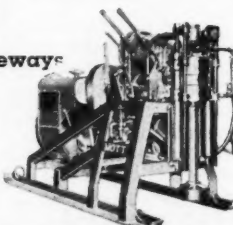
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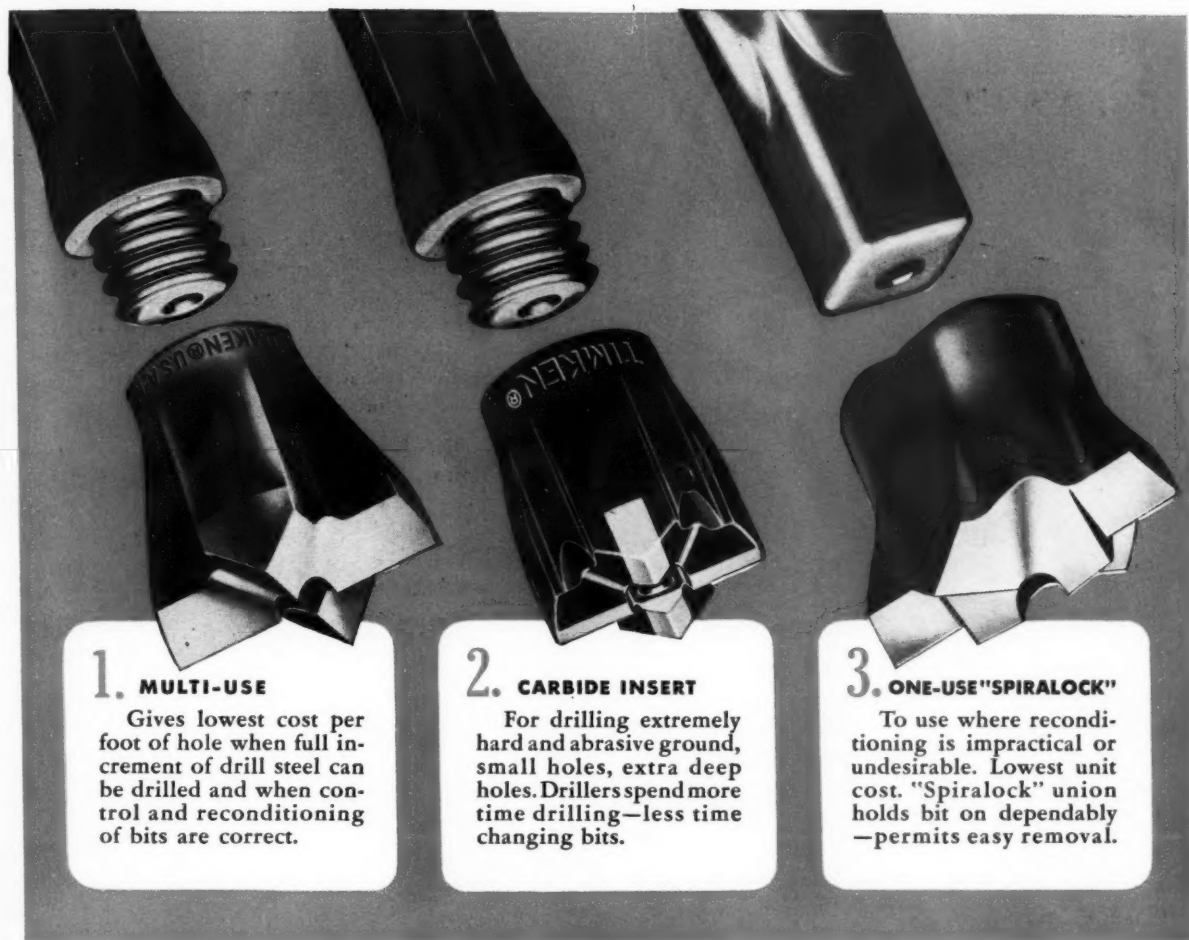
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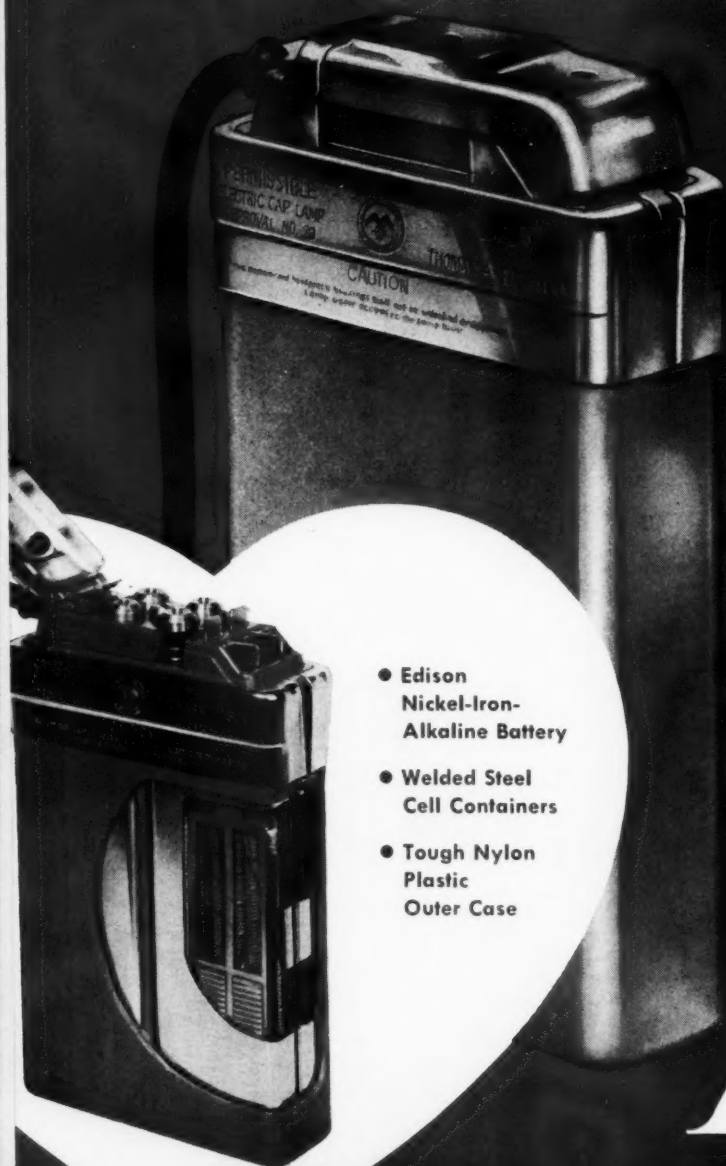
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